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STRAITS SETTLEMENTS

Vol. XI 30th August, 1941 Part 3

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THE
GARDENS' BULLETIN
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Vol. XI 30th August, 1941 Part 3

NOTES ON THE SYSTEMATY AND DISTRIBUTION OF MALAYAN PHANEROGAMS, IV: IXORA

By E. J. H. CORNER,
Botanic Gardens, Singapore

After studying for several years the living plants of Ixora in Malaya, I find that the two most valuable guides to the affinity, and therefore to the identification, of the species are the colour of the corolla and the fragrance or scentlessness of the flower. After these one must have recourse to the size of the bracts and sepals and the shape and venation of the leaf. The size and hairiness of the corolla and even the shape of the petals I find to be most variable and, for the majority of the Malayan species, by no means specific. But the most important character of the genus is found in the structure of the inflorescence, whether its branches are articulate or not, because this criterion distinguishes *I. grandifolia,* with its inarticulate inflorescence falling off in one piece, from all other Malayan species. It is a primitive mark that connects Ixora with such genera as Pavetta and Tarenna.

It seems that the extraordinary variability in the size of the leaf and corolla is not appreciated. From the most recent works on the genus (Craib, Bremekamp) the impression is gained that many new species can be blocked out from the old and that minute differences in hairiness, leaf-size, or shape, and length of corolla-tube suffice to define them. But I am certain that this view is mistaken and, if followed, must lead to the making of so many "species" that the classification of the genus will become impossible. Such splitting, based on relatively few herbarium specimens, merely obscures the issue which is to have names for the major, well-defined groups of individuals. Moreover, through limitation to the herbarium, many equally variable and important characters such as the colour of the flowers and the shininess of the leaves must be omitted, though from such features the living plants are most easily recognised. If it is permissible to make species on the

size of the leaf, so it is on the colour of the corolla *e.g. I. candida* and *I. lutea*. But the more one studies the wild plants the more one will encounter intermediates between the microspecies of the "splitters". For example, a good case might be put forward for uniting *I. chinensis, I. javanica, I. congesta, I. Lobbii* and *I. Robinsonii* because there are a few plants which cannot be classified as one or the other, but can be referred equally well to two of the species. To the field botanist in Malaya, Ixora is clearly in a 'state of evolution' comparable with that of Rubus, Rosa, or Oenothera and, systematically, as complicated. We must, therefore, compromise between the needs of the field-botanist and the scruples of the herbarium to procure a satisfactory classification.

To prove my point, I have defined the Malayan species in the widest possible sense and, under the red-flowered species, have indicated to some extent their variation by numbering the recognisable forms. It will be seen that these show such gradation that none can be separated as a species *e.g. I. javanica* with the corolla varying from 2–5 cm. long, 1–2·5 cm. wide, and from a basic yellow through pink to deep red. That these continuous variations should have been overlooked by previous authors must throw grave doubts on the value of their classifications. Certainly the keys of King, Ridley and Pitard are impracticable. I believe that by combining all such variable characters as the size, shape, texture, colour, shininess and venation of the leaf, the length of the stipule, petiole and peduncle, the variation in size of the corymbs and flowers and the colour of the petals, no less than a hundred 'forms' of *I. javanica* could be detailed for Malaya alone. And how many of these characters and combinations of characters would be hereditary? I think that the main species of Ixora are known. It is now time for the field-botanist and the geneticist to explore their variation.

I have not attempted to dissect Bremekamp's latest paper on the Malaysian species (Bull. Jard. Bot. Buit. ser. 3, vol. 14, *1937*). I doubt if anyone will be prepared to struggle through so much detail before the name of a species can be found. The classificatory value of the details I consider so dubious and trivial that I would regard most of Bremekamp's species as forms of subspecies and his series as species, did our study of these forest plants usefully extend to such fractionising. If so many "species" can be recognised in the herbarium, what is to become of the genus when we shall have reckoned also with all the characters that disappear from the living plants on drying? If the length of the rudimentary sepals is so important or the

excursion of a few epidermal cells on the style into macroscopic vision, then so are the sliminess of the root-cap, the rate of mitosis, the latent period of tropism, the glitter or convexity of the epidermal cells and the exact tint of the young leaf. I disagree so profoundly with unargued "splitting" that I leave it to others to consult this new language.

KEY TO IXORA IN MALAYA

Corolla white or greenish white: fragrant .. Group A

Corolla, with pink or reddish tube and white or pinkish petals, not changing colour: flowers often fragrant: wild .. .. .. Group B

Corolla wholly yellow, red or, occasionally, pink, mostly with yellow or orange petals changing to red: mostly scentless (all cultivated, coloured Ixoras) .. .. .. Group C

Group A

Sepals more or less leafy, at least twice as long as the ovary

- Dwarf shrub with ovate red sepals: wild .. *I. clerodendron*
- Medium to tall shrubs or small trees: sepals green or pinkish
  - Sepals 2–3·5 mm. long: leaves rather narrow and blunt, with 6–9 pairs of side-veins: cult. .. .. *I. finlaysoniana*
  - Sepals 3–12 mm. long: leaves medium to broad, pointed, with 10–20 pairs of side-veins
    - Sepals 3–6 mm. long: wild .. *I. umbellata*
    - Sepals 6–12 mm. long: cult. (? wild) .. .. var. *multibracteata*

Sepals linear, triangular or toothlike, not leafy, shorter than the ovary or not more than twice as long (except *I. Brunonis*)

- Stems, infloresc. and undersides of leaves hairy: veins 10–20 pairs
  - Dwarf shrub: leaves narrowed to the distinct stalk: corolla glabrous .. *I. pumila*
  - Medium-sized shrub: leaves more or less cordate, sessile or indistinctly stalked: corolla hairy .. .. *I. Brunonis*
- Glabrous: leaves drying blackish
  - Blade tapered to the base: corolla-tube ·8–1·3 cm. long .. .. *I. nigricans*
  - Blade generally broadly rounded at the base: corolla-tube 2–3 cm. long .. var. *ovalis*

Group B

Inflorescence upside down, the branches jointed: flowers not fragrant .. .. .. *I. pendula*

Inflorescence erect or not bent down, the branches not jointed: often fragrant

- Blade elliptic, ovate or obovate with distinct veins .. .. .. *I. grandifolia*
- Blade lanceolate, rather thick, with indistinct veins .. .. .. var. *lancifolia*

GROUP C

Corolla-tube less than 1·5 cm. long: fragrant: wild
- Flower-clusters 2–5 cm. wide: corolla-tube 8–12 mm. long: lowlands .. .. — *I. concinna*
- Clusters 6–20 cm. wide: tube 3–9 mm. long: mountains .. .. .. — *I. micrantha*

Corolla-tube more than 1·5 cm. long: not fragrant
- Sepals 2–5 mm. long, longer than the ovary, rather leafy
  - Flowers yellow-red: leaves not cordate: wild .. .. .. — *I. Kingstonii*
  - Flowers pink: leaves often cordate: cult. .. .. .. — *I. coccinea* var. *rosea*
- Sepals ·5–1·5 mm. long, triangular, tooth-like, shorter than the ovary
  - Leaf more or less sessile, the base narrowly to widely cordate, at least on the vegetative shoots
    - Leaf 5–18 cm. wide: infloresc. branches red: petals blunt: wild
      - Dwarf shrub ½ m. high: leaves crowded .. — *I. Scortechinii*
      - Spindly shrub 1–2¼ m. high: leaves well-spaced .. — var. *caulescens*
    - Leaf 1–7 cm. wide: infloresc. branches green: petals pointed: cult.
      - Flower red or orange turning red
        - Leaves acute: petals lanceolate-elliptic .. — *I. coccinea*
        - Leaves often blunt: petals ovate-elliptic .. — var. *bandhuca*
      - Flowers yellow, unchanging — var. *lutea*
      - Petals yellow fading to pale pinkish white .. .. — var. *decolorans*
      - Petals yellow then streaked with rose-pink .. — var. *aureo-rosea*
      - Petals pink, turning deep clear pink .. .. — var. *rosea*
  - Leaf stalked, the base never cordate: infloresc. branches mostly red
    - Leaf-stalk 1–3 mm. long: cult.
      - Leaves small, narrow, ·7–2·5 cm. wide: petals pointed .. .. — *I.* "Sunkist" p. 235
      - Leaves rather blunt, 2·2–6·5 cm. wide: petals blunt
        - Corolla 1·4–1·6 cm. wide, tube 3–3·5 cm. long .. — *I. chinensis*

Corolla 1–1·2 cm. wide, tube 1·8 cm. long .. .. var. *dixiana*

Leaf-stalk 3–20 mm. long: wild or cult.

Riverside shrubs with lanceolate leaves ·7–3 cm. wide

Leaves glossy: side-veins 8–15 pairs, distinctly inarching near the margin .. *I. Lobbii* var. *stenophylla*

Leaves rather dull: side-veins 6–10 pairs, not inarching *I. javanica*

Not riverside: leaves 3–15 cm. wide

Mountain shrub of the Tahan neighbourhood (Ulu Pahang, Trengganu, Kelantan): leaves leathery, very gradually tapered into the stalk: petals pointed .. *I. Robinsonii*

Leaves scarcely leathery: stalk always distinct from the blade

Leaves with 14–26 pairs of side-veins, distinctly inarching

Leaf rather narrowly elliptic to narrowly obovate, acuminate, up to 8·5 cm. wide: side-veins 14–26 pairs: petals acute .. *I. Lobbii*

Leaf rather broadly elliptic, up to 15·5 cm. wide: side-veins 13–19 pairs: petals mostly blunt .. *I. congesta*

Leaves with 6–14 pairs of side-veins, up to 11·5 cm. wide *I. javanica*

Side-veins 6–12 pairs, distinctly inarching .. var. *retinervia*

Side-veins not inarching
- Side-veins 9–14 pairs .. var. *multinervia*
- Side-veins 6–9 (–10) pairs var. *paucinervia*
  - Flowers buff-yellow or pale orange buff .. "Yellow Javanica"
  - Flowers yellow then clear pink, never red "Pink Javanica"
  - Flowers yellow turning reddish pink or red "Red Javanica"

I. amoena Don

Gen. Syst. 3, *1834*, p. 571.

Typus:—

Wallich 6121 D, E, F, (Penang): fide Hooker.

Interpretations:—

Hooker, F.B.I. 3, p. 146.

Pitard, Fl. Gen. Indoch., 3, p. 328.

Craib, Fl. Siam. En., 2, p. 149.

Misinterpretations:—

King and Gamble, Mat. Fl. Mal. Pen. 4, p. 154 as *I. stricta* Roxb.

Ridley, Fl. Mal. Pen. 2, p. 94, as *I. stricta* Roxb.

Synonyms:—

Ixora stricta var. *amoena* Ridley, Fl. Mal. Pen. 2, *1923*, p. 94.

From the published descriptions, it is impossible to see how *I. amoena* differs from *I. javanica*. The latest opinion is that of Craib who states that *I. javanica* has longer stipules, but, as he gives not the length of stipule in either, one cannot appreciate the difference. In *I. javanica* I find that the stipular point varies from 1–8 mm. even on the same plant but that it is generally long in plants growing in shady places, especially by riversides, and short in plants in the full open. Hooker says that *I. amoena* has a laxer habit and "longer, lanceolate, more membranous leaves" with more distinct petioles than *I. javanica*. Pitard copies Hooker. King and Gamble remark that only a slight difference in reticulation of the leaves distinguishes *I. amoena* from *I. javanica* (=*I. stricta* in their sense). Ridley distinguishes his variety *amoena* by the more coriaceous leaves in contradiction to Hooker, though both cite Wallich's collection. In the following list of identified specimens, a still greater variety of treatment will be discovered. Hence I regard *I. amoena* as a synonym of *I. javanica*.

IDENTIFIED SPECIMENS OF *I. AMOENA* IN THE SINGAPORE HERBARIUM

Craib's identifications:—

Keith 129 (= *I. javanica* form 1): Kiah 24360 (= *I. javanica* form 2). Haniff and Nur 3910 (= *I. javanica* form 9): Curtis 2607, Ridley 8354 (= *I. javanica* form 10): Ridley 14998 (= *I. javanica* form 23): (evidently Craib has not considered the variation in flower-size).

British Museum's identification:—

Robinson and Kloss, Korinchi Exp. 19.3.14 (= *I. javanica* form 29).

Merrill's identifications:—

Moulton 6703/15 (= *I. Lobbii* form 3): (almost identical specimens from the Anamba and Natuna Islands, v. Steenis 897 and Henderson 20185, are determined by v. Steenis as *I. javanica*).

Winkler 2154 (= *I. javanica* var. *retinervia*, probably).

I. Brunonis Don

Gen. Syst. 3, *1834*, p. 573.

A shrub up to 3 m. high: *twigs, corymbs and undersides of leaves rather closely hispid-hairy*, uppersides of leaves soon glabrous.

Leaf-blade 14–34 × 4–10·5 cm., *lanceolate-obovate*, or nearly oblong, *cuspidate-acuminate, the base narrowly to rather broadly cordate*, membranous: *side-veins* 11–17 pairs, more or less inarching near the margin: *petiole* 0–5 mm. long, very short, hispid: *stipular point* 9–20 mm. long, *filiform*.

Corymb 6–12 cm. wide, generally dense and sessile, or with a peduncle up to 2 cm. long, *the bracts, sepals, branches and corolla hispid hairy: bracts* 5–10 mm. long, filiform: *flowers white, fragrant: sepals* 2·5–5 mm. long, filiform: *corolla-tube* 3–4 cm. long, the outside of the tube and the mouth hairy: *petals* 6–9 mm. long × 2–3 mm. wide, oblong, acute, hairy on the outside.

Distribution:—Burma, Siam, North Malaya (Penang, Upper Perak, Kedah).

Type:—Wallich 6136 (Penang).

Very little is known about this species which appears to be rather rare. The oblong-obovate, cuspidate, hairy leaf with almost sessile, cordate base is distinctive.

I. chinensis Lam. Chinese Ixora

Encycl. 3, *1789*, p. 344.

Synonyms:—

I. stricta Roxb. Hort. Beng. *1814*, p. 10: Fl. Ind. 1, *1820*, p. 388: Fl. Gen. Indoch. III, p. 326: haud sensu Hooker, King, Gamble, Ridley.

Flamma silvarum peregrina Rumph. Herb. Amb. 4, p. 107, t. 47.

Icones:—

Rumphius loc. cit.

Curtis, Bot. Mag. t. 169 (as *I. coccinea*).

Wight, Ic. t. 184 (as *I. stricta*).

Bot. Reg. t. 782 (as *I. crocata*).

Typus:—

Sonnerat, spec. sinense, in Herb. Lam.

A glabrous shrub, ? flowering all the year in Malayan countries.

Leaf-blade 4–15·5 × 2·2–6·5 cm., elliptic, lanceolate-elliptic or narrowly obovate, *subacute or blunt,* tapering gradually to the suddenly rounded narrow base or even narrowly cordate, not amplexicaul, *subsessile,* more or less coriaceous, rather dull green often yellowish green, with 6–10 pairs of side-veins not or indistinctly inarching: *petiole* ·1–·3 cm. long: stipular point ·1–·3 cm. long.

Corymb 5–10 cm. wide, dense, sessile or with a peduncle up to 1·5 cm. long, *with crimson, articulate branches;* sepals blunt to subacute, shorter than the ovary: corolla-tube 3–3·5 cm. long, the limb 1·4–1·6 cm. wide, *the petals broadly elliptic* or *orbicular, very blunt with the edges not or scarcely recurved, apricot yellow turning brick red.*

Distribution:—S. China, Indochina: elsewhere introduced.

I follow Merrill in his interpretation of this species (Interpr. Rumph. Herb. Amb. p. 487) though he did not give botanical evidence or a description of the species that he had in mind. But the small, subsessile, blunt, few-veined leaves and extraordinarily blunt, broad petals, which make the flower look very full, readily distinguish it and by this means one can certainly unite the plants of Rumphius, Lamarck and Roxburgh. Pitard's description (Fl. Gen. Indoch.) corresponds exactly.

Whether *I. chinensis* is specifically distinct from *I. javanica* I do not know. The very short petiole of *I. chinensis* appears to be the only diagnostic character. A critical study of the wild species in Siam and Indochina (cf. *I. amoena* sensu Pitard) is much needed. *I. crocata* Lindley, which has always been referred to *I. stricta* sensu Hooker (=*I. javanica*), seems to me unquestionably *I. chinensis.* Whether the illustration of *I. javanica,* Bot. Mag. t. 4586, represents *I. javanica* or *I. chinensis* I cannot decide.

On the other hand, *I. chinensis* has been often mistaken for *I. coccinea* and it seems that it still is. The more or less amplexicaul leaf-base and pointed petals distinguish *I. coccinea,* but fragmentary herbarium specimens may not be easy to identify because the leaves on short flowering stems may be reduced and have a base more like that of *I. chinensis.* Moreover, the garden variety called *I. dixiana* is referred in the Index Kewensis to *I. coccinea* though it is certainly a dwarf form of *I. chinensis. I. dixiana,* in fact, differs from *I. chinensis* only in its dwarf habit (½–1 m. high) and small flowers (corolla-tube 1·8 cm. long, limb 1–1·2 cm. wide). I am inclined to think that the plant called by the garden name "Sunkist" in this paper is a hybrid between *I. chinensis* and *I. javanica* or *I. Lobbii.* I have seen no published description that would fit it.

I. stricta Roxb. sensu Hooker, King and Ridley is *I. javanica.*

I. clerodendron Ridley

Trans. Linn. Soc. 3, *1893*, p. 311.

A small, little branched shrub; young parts pubescent.

Leaf-blade 23 × 9 cm., lanceolate or obovate, narrowed to both ends, glabrous above, pubescent beneath: stipules 1·2 cm. long, triangular subulate.

Corymb 2·5 cm. wide, dense, pubescent, many-flowered: *flower white: sepals* 6 mm. long, *ovate, pubescent, longer than the ovary, red:* corolla-tube 2·5 cm. long: petals 3 mm. long, oblong-ovate, subacute, white.

Fruit 6 mm. long, grey with red-streaks, crowned with the red sepals.

Distribution:—Pahang (Malaya).

Type:—Ridley's specimen from Kuala Tembeling.

This description is taken from Ridley's. There is no specimen in the Singapore Herbarium. The species must come very close to *I. pumila* which differs in the smaller, lanceolate sepals and relatively broader leaves. I suspect that they may be identical. Both are from the same district of Pahang.

I. coccinea L. Indian Ixora

Sp. Pl. 3rd Ed., *1764*, p. 159. (excl. synon.).

Synonyms:—

I. grandiflora Br., Bot. Reg. t. 154.

Icones:—

Bot. Reg. t. 154 (as *I. grandiflora*).

Wight Ic. t. 153 (as *I. coccinea*).

A shrub or treelet to 4 m. high, flowering throughout the year, glabrous except the puberulous branches of the corymb.

Leaf-blade 3·5–13 × 1–7 cm., elliptic, varying blunt to acute, *the base more or less widely cordate and amplexicaul, sessile or shortly stalked,* (often narrowly cordate or broadly rounded and shortly stalked on short flowering twigs), rather dark shiny green, scarcely coriaceous: side-veins 9–14 pairs, inarching near the edge: *petiole* 0–7 mm. long: stipular point 2–7 mm. long.

Corymb 5–10 cm. wide, sessile or with a short peduncle up to 2·5 cm. long, *the branches puberulous, articulate, green,* the flowers in trichasia the central one generally sessile, the laterals shortly stalked: *sepals* broad, subacute, *reddish,* shorter than the green ovary; corolla-tube 2–3·5 cm. long, the limb 1·3–3 cm. wide, the *petals* ·2–·8 cm. wide, *lanceolate-elliptic, acute, pinkish yellow or reddish pink with orange base turning blood red or crimson.*

Distribution:—N.E. India, China, Indochina; elsewhere introduced.

Type:—Osbeck's specimen of the Flora Zeylanica.

var. **bandhuca** Ixora Bandhuca

Syn. *I. bandhuca* Roxb. Fl. Ind. I, *1820*, p. 386.

Wight Ic. t. 149 (copy of Roxburgh's drawing of *I. bandhuca*).

Bot. Reg. t. 513.

A bushier, more spreading shrub: *leaves obtuse or subacute: petals* 8–10 mm. wide, *ovate-elliptic, rather suddenly pointed,* not lanceolate-acute, *hence the flower fuller:* corolla-tube 3·5–4 cm. long, limb 2·5–3 cm. wide.

Distribution:—Hindustan.

var. **lutea** Yellow Coccinea

Syn. *I. lutea* Hutchinson Bot. Mag. t. 8439.

Petals buff-yellow, unchanging or fading pale yellow, never reddening, ovate-elliptic: sepals green: corolla-tube whitish.

Origin:—Royal Botanic Gardens, Peradeniya, Ceylon.

var. **decolorans** var. nov. Pallid Coccinea

Lamina semper minore, 2·5–7·5 × 1·5–3·8 cm., elliptica, *acuta, basi anguste cordata,* (laminis ramulorum floriferorum saepe vix cordatis vel cuneatis), costis lateralibus utrinsecus 7–12: petiolo 1–2 mm. longo.

Floribus luteis dein roseo-pallescentibus vel albido-roseis; corollae tubo albido, 2·7–3·1 cm. longo; corollae limbo 2–2·3 cm. lato, petalis ·6–·7 cm. latis, ovato-ellipticis, acutis.

Origin:—horti?

Typus:—frutex in hort. bot. Singap.

var. **aureo-rosea** var. nov. Gold Coccinea

Petalis luteis dein marginem versus roseis vel roseo-striatis, semper aureo-roseis, nunquam coccineis, late ellipticis, acutis, 7–8 mm. latis: corollae tubo 4–4·5 cm. longo, pallide roseo-luteo, limbo 2·7–3 cm. lato.

Origin:—horti?

Typus:—frutex in hort. bot. Singap.

var. **rosea** var. nov. Pink Coccinea

? Pavetta incarnata Bl. Bijdr., *1825,* p. 950.

Floribus roseis, primo pallide roseis, *nec rubris nec luteis: sepalis* 2–2·5 mm. longis, *late lanceolatis, foliaceis,* roseo-marginatis, *ovario longioribus:* corollae tubo 1·5–2·5 cm. longo, pallide roseis, limbo 1·2–2·3 cm. lato: petalis ·2–·6 cm. latis, oblongo-ellipticis, *acutis* vel subacutis, proxime marginibus recurvatis: ovario 1–1·5 mm. longo, virido: ramulis inflorescentia viridis.

Origin:—? : cult. in Malaya.

Typus:—Corner 34514 (Woodleigh Nursery, Singapore, 5.11.37 = Form 8).

I. coccinea was, and perhaps still is, confused with *I. chinensis,* as I have mentioned under that species. But the description of Linnaeus indicates how *I. coccinea* must be interpreted, that is "foliis ovalibus semiamplexicaulibus", and in this wide sense it is a useful species. I have often observed that the leaves on flowering twigs incline to the shape of those of *I. chinensis* so that such a twig by itself may be difficult to distinguish from one of *I. chinensis* except for the pointed petals. However, amplexicaul cordate leaves can always be found on sterile shoots of *I. coccinea* and never on those of *I. chinensis,* or indeed, of any

other red-flowered species in the sense in which I understand them. I believe also, that one may find that *I. coccinea* has always green and *I. chinensis* red corymb-branches.

I. bandhuca seems not to be recognised nowadays. From dried specimens it is no doubt difficult, but with the living plants it is easy. The difference from *I. coccinea* is well shown in Wight's two plates which are copies of Roxburgh's drawings. The distinctions are, however, merely varietal. The var. *bandhuca* is the commonest variety of *I. coccinea* in Malaya.

I. lutea is clearly only a colour-variety of typical *I. coccinea,* in which the red colour does not develop. Hence I have reduced it to varietal rank. The amplexicaul leaves distinguish it from the yellow variety of *I. javanica.*

The var. *decolorans* is proposed for a bush growing in the Singapore Botanic Gardens and which has been mistakenly called *I. bandhuca* for many years. I have not found a description of it. The washed-out colour of the flower is not beautiful.

The var. *aureo-rosea* I propose for another plant growing in the Singapore Botanic Gardens, and believed to have been introduced from Kew. I can find no description of it either. It is a magnificent, free-flowering plant of considerable vigour for which a name has long been needed.

The variety *rosea* is probably *Pavetta incarnata* Bl. of which there is no modern or ample description. It has the subsessile amplexicaul, pointed leaves typical of *I. coccinea* on the vegetative shoot, but those on the flowering shoots have generally a simple, rounded base suggesting that of *I. javanica.* The sepals offer the only discrepancy in identifying the variety with *I. coccinea,* the sepals of which do not exceed the ovary in length, but a specific value can hardly be attached to this feature when the overwhelming similarity with *I. coccinea* in other respects is borne in mind. I do not find that a pink variety of *I. coccinea* has been described and as this is a frequent plant in Malayan gardens it is in need of a name. If *I. rosea* Wallich (Bot. Mag. 2428, Bot. Reg. 540) is correctly identified with *I. stricta* sensu Hooker (= *I. javanica*) then it cannot be my var. *rosea,* though t. 2428 is very suggestive of it, excepting the pubescence.

What I have called *I. coccinea* form 4 has been grown for several years in the Singapore Botanic Gardens as *I. oculata,* which name I cannot find in botanical literature.

As I have remarked under *I. chinensis,* the garden species *I. dixiana* is a variety of it and not of *I. coccinea* as stated in the Index Kewensis.

KEY TO THE FORMS AND VARIETIES OF *I. COCCINEA*

Petals red
- Petals lanceolate elliptic, attenuate, ·2–·8 cm. wide .. .. *I. coccinea*
  - Corolla-tube 2–2·5 cm. long
    - Limb 1·3–1·6 cm. wide: petals ·2–·3 cm. wide .. .. .. Form 1
  - Corolla-tube 3–3·5 cm. long
    - Limb 1·5–1·7 cm. wide, petals ·4–·5 cm. wide .. .. .. Form 2
    - Limb 2–2·3 cm. wide: petals ·5–·6 cm. wide .. .. .. Form 3
    - Limb 2·7–3 cm. wide: petals ·6–·8 cm. wide .. .. .. Form 4
- Petals ovate elliptic, rather suddenly pointed, ·8–1 cm. wide .. .. var. *bandhuca*

Petals yellow, never reddening .. .. var. *lutea*
- Corolla-tube 3·2–3·7 cm. long: limb 2·4–2·7 cm. wide: petals ·6–·8 cm. wide .. .. Form 5
- Corolla-tube 4–4·5 cm. long: limb 2·7–3 cm. wide: petals ·8–·9 cm. wide .. .. Form 6

Petals yellow, fading pale pinkish white .. var. *decolorans*

Petals yellow then streaked with rose, rather broad var. *aureo-rosea*

Petals pale pink turning deep pink, never red or yellow, oblong elliptic .. .. .. var. *rosea*
- Corolla-tube 1·5–1·8 cm. long: limb 2–2·3 cm. wide: petals ·5–·6 cm. wide, subacute .. Form 7
- Corolla-tube 2–2·5 cm. long: limb 1·2–1·5 cm. wide: petals ·2–·3 cm. wide, acute with a minute mucro .. .. .. Form 8

I. concinna Hook. f. Trogon Ixora

F.B.I. 3, *1880*, p. 147.

A small to medium-sized tree up to 20 m. high: *wholly glabrous.*

Leaf-blade 6·5–18 × 2–7 cm., elliptic, tapered to each end, more or less acuminate, membranous or subcoriaceous: *side-veins* 8–13 pairs, distinctly inarching: petiole ·2–1·2 cm. long.

Corymb 2·5–5 cm. wide, sessile or on a short peduncle up to 1·2 cm. long, the branches slender 1 mm. wide or less, articulate, glabrous (? red or green): *sepals* ·5–2·5 mm. long, lanceolate-triangular, *variable in size,* shorter than the ovary, as long as or longer than in different collections, never leafy: *corolla-tube* 8–12 mm. long, *short, yellowish pink to reddish pink: corolla-limb* ·7–1 cm. wide, *the petals acute, yellow turning pinkish and finally dull-red,* or partly red: ovary 1–1·5 mm. long: *flowers fragrant.*

Fruit ·7–1 cm. wide.

Distribution:—Malaya, Sumatra, Borneo.

Type:—Wallich 6149 (Singapore).

This is one of the less variable Ixoras. It is distinguished by its small leaves and flower-clusters and its fragrant flowers. The variable features are the texture of the leaf and the length of the sepals. The leaf may be membranous or distinctly coriaceous, perhaps dependent on the size of the tree and its situation. The sepals may be shorter than

the ovary or considerably longer or of intermediate length, their length being fairly constant in each collection. Although this variation seems to have escaped the attention of botanists, so that we have been spared from numerous micro-species which would have made the identification of the trees impossible until one had seen the sepals, the range of variation is greater than that of any other species, being 5 times the minimum length of the sepals.

I. concinna has been mistaken in the Singapore Herbarium and in Ridley's Flora for my *I. javanica* var. *retinervia* from which it differs in its smaller, fragrant flowers, less pointed leaves with the veins making a more acute angle with the midrib and not so distinctly inarching, its laxer and more slender inflorescence branches (2 mm. wide in *I. javanica* var. *retinervia*) and smaller fruits (1–1·3 cm. wide in var. *retinervia*).

I. congesta Roxb. Malayan Ixora

Fl. Ind. 1, *1820*, p. 397.

Synonyms:—

I. Griffithii Hook. Bot. Mag. *1847*, t. 4325.

I. fulgens Roxb. sensu Hook. fil. F.B.I. 3, *1880*, p. 146.

An evergreen shrub or small tree like *I. javanica* but:—*Leaf-blade* generally larger or broader, 13–31 × 5–15·5 cm. wide, *with more numerous, stronger lateral veins* (13–19 pairs) generally with distinctly inarching marginal loops.

Sepals blunt to acute, *generally acute.*

Petals yellow or pinkish yellow turning red, *generally blunt to subacute.*

Distribution:—W. Malaysia to the Moluccas.

Bremekamp has recently substituted the name *I. Griffithii* for Malayan plants which have been referred to *I. congesta* (Journ. Bot. 75, *1937*, p. 169). Roxburgh described *I. congesta* from a plant growing in the Calcutta Botanic Gardens and said to have been derived from the Moluccas. There is no type and the description is brief. Hence Bremekamp writes of it "species moluccana dicta, parum descripta et absentia typi haud certe noscenda, dubiosissima". Why then did Hooker reduce *I. Griffithii* to *I congesta,* in which he was followed by Kurz, King, Gamble, and Craib? I think that Bremekamp has overlooked the traditions of Indian Botany which were handed from Roxburgh to Hooker through the succession of Superintendents of the Calcutta Botanic Gardens and through Roxburgh's own circle of botanists, of which Wight and Arnott have given us the picture. As no reason is advanced for rejecting this long-standing interpretation of *I. congesta,* one must continue to employ it in accordance with the Rules of Nomenclature. *I. fulgens* offers a parallel case where the full description of Rumphius should enable

one to identify Roxburgh's species, but Bremekamp denies the Moluccan origin of *I. fulgens.*

Merrill has identified *I. congesta* with *I. fulgens* but, as I have shown under that species, nobody has yet identified *I. fulgens* (Enum. Philipp. Fl. 3, p. 548). Rumphius' plate, which is the type of *I. fulgens,* shows an Ixora with pointed petals. The only form of *I. congesta* with pointed petals is my form 9 and that most botanists would probably not admit as *I. congesta.*

Although it is generally easy to distinguish *I. congesta, I. Lobbi* and *I. javanica,* there are collections in the Singapore herbarium which connect them as I have mentioned under those species. What I have called *I. congesta* form 9 is especially problematic.

KEY TO THE FORMS OF *I. CONGESTA*

Corolla-tube 3·7–4·5 cm. long
  Limb 1·5–1·8 cm. wide: petals ·4–·5 cm. wide, blunt to subacute .. .. Form 1
  Limb 1·8–2·1 cm. wide: petals ·5–·6 cm. wide, subacute .. Form 2
Corolla-tube 2·5–3·8 cm. long
  Limb 1–1·3 cm. wide
    Petals ·3–·4 cm. wide, subacute .. .. Form 3
    Petals ·5–·7 cm. wide, blunt .. .. Form 4
  Limb 1·4–1·8 cm. wide: petals blunt to subacute
    Petals ·3–·5 cm. wide .. .. .. Form 5
    Petals ·5–·7 cm. wide .. .. .. Form 6
  Limb 1·8–2·1 cm. wide
    Petals ·3–·5 cm. wide, subacute .. .. Form 7
  Limb 2–2·8 cm. wide: petals ·5–·7 cm. wide
    Petals blunt to subacute .. .. .. Form 8
    Petals acute .. .. Form 9
  Limb 2·5–3·8 cm. wide: petals blunt to subacute
    Petals ·5–·7 cm. wide, orange yellow then red: limb 2·5–3·8 cm. wide: veins of leaf 9–14 pairs .. Form 10
    Petals ·7–·8 cm. wide, pale yellow then salmon pink: limb 2·5–3 cm. wide: veins of leaf 14–19 pairs .. Form 11

Form 1

Corolla-tube 3·75–4·5 cm. long, limb 1·5–1·75 cm. wide: petals ·35 cm. wide, blunt to subacute.

Malayan Collections

Perak; Derry 10716, Henderson 10202.
Johore; Corner 32226, s.n. 1.9.35 (Kota Tinggi-Mawai Road).
Singapore; Cantley s.n., Ridley 4168 (det. *I. Lobbii*), s.n. 9.11.99 (Chua Chu Kang).

Form 2

Corolla-tube, 3·75–4·25 cm. long, limb 1·75–2·1 cm. wide: petals ·5–·6 cm. wide, subacute.

Malayan Collections

Malacca; Goodenough 1907.

Form 3

Corolla-tube 3–3·75 cm. long, limb 1–1·25 cm. wide: petals ·35–·45 cm. wide, blunt to subacute.

Malayan Collections

Penang; Curtis 2975.
Perak; Cantley s.n., Kunstler 675, Wolferston s.n. April 1900, Wray 702.
Pahang; Henderson 24432.
Selangor; Ridley 13409.
Johore; Corner 25968, Ridley s.n. 1900 (Batu Pahat), Singapore F.827.
Singapore; Cantley 2668, 2672, 3005, Goodenough s.n. 1892 (Pulau Ubin) Ridley 5675, 6911, s.n. 1890 (Tg. Penjuru).

Form 4

as Form 3 but petals ·5–·65 cm. wide.

Malayan Collections

Singapore; Cantley s.n. (det. *I. stricta*).

Form 5

Corolla-tube 3–3·75 cm. long, limb 1·5–1·75 cm. wide: petals ·35–·5 cm. wide, blunt to subacute.

Malayan Collections

Penang; Curtis 667, 1729, 2257 (det. *I. Lobbii* by King & Gamble).
Perak; Curtis s.n. Feb. 1900 (Lumut), Henderson 10203, Ridley s.n. Feb. 1892 (Lumut).
Pahang; Nur 18786.
Selangor; Goodenough 10481, Hume 7162, 7607.
Negri Sembilan; Holttum 9691, 9768, Nur 11570.
Malacca; Alvins s.n., Burkill 788 (det. *I. fulgens*), Derry 8, Goodenough 1692.
Johore; Corner 29766, Kiah 32326, Ridley s.n. 1894 (S. Bau).
Singapore; Hullett 118, Ridley s.n. Reservoir Woods, s.n. Oct. 1889 (Chan Chu Kang).

The flowers are pinkish yellow on opening, turning to light reddish orange. It seems that there may be states with persistently pink flowers.

Form 6

as Form 5 but petals ·5–·7 cm. wide.

Malayan Collections

Penang; Curtis 2265 (*see* also Form 8).

Form 7

as Form 5 but corolla-limb 1·75–2·1 cm. wide, petals subacute.

Malayan Collections

Perak; Henderson 10116.
Malacca; Goodenough 1692.

Form 8

as Form 5 but corolla-limb 2–2·5 cm. wide, petals ·5–·65 cm. wide, blunt to subacute.

Malayan Collections

Penang; Curtis 2265 (*see* also Form 6) (det. *I. fulgens* by King).
Selangor; Hume 7577.

Form 9 Ixora Singapore

Leaves as in *I. congesta* but *rather narrow* 4–28 × 5–9 cm., with 12–18 pairs of lateral veins.

Sepals rather blunt.

Corolla-tube 2·5–3·5 cm. long, the limb 2·3–2·8 cm. wide: *petals* ·5—6 cm. wide, ovate-lanceolate, *acute,* opening pinkish buff with only the base clear orange yellow, turning deep carmine-red or crimson.

Malayan Collections

Singapore (cult. in Hort. Bot. Sing.); Corner 30794, 33699, Nur 22, s.n. 26.9.18, Ridley s.n. 1891.

It seems that this Ixora was received from Kew many years ago as *I. macrothyrsa.* But the plants in the Singapore Gardens have lost their labels and there is no certainty whence they came. Instead, the name *I. macrothyrsa* has for many years been given to the Common Red Ixora of our Gardens which I call *I. javanica* form 7.

Whether *I. congesta* form 9 is *I. macrothyrsa* I have no means of ascertaining. According to description (Bot. Mag. t. 6853) the flowers of *I. macrothyrsa* are persistently red, but the description is not sufficiently critical.

This form 9 has the leaf-shape and size of *I. javanica,* the pointed petals of some forms of *I. javanica* as well as of *I. Lobbii,* but the numerous veins of *I. congesta.* Its systematic position is problematical yet demonstrative: because of the veins I classify it under *I. congesta.* It corresponds remarkably well with *I. fulgens* as that species must be interpreted from Rumphius' plate and description.

Unlike the common *I. javanica* form 7, this form 9 is strictly seasonal in flowering like the wild plants of *I. congesta, I. Lobbii* and *I. javanica.*

Form 10 Ixora Kemaman

Leaves with only 9–14 pairs of side-veins.

Corolla-tube 3·25–4 cm. long, the limb 2·5–3·8 cm. wide: petals ·5—65 cm. wide, oblong, blunt.

Malayan Collections

Trengganu; Corner 30002 (Kemaman).

Pahang; Symington 28825 (Gunong Tapis), 28761 (Sungei Lembing).

This magnificent Ixora with large, brilliant flowers appears to be limited to the watersheds of the Kuantan and Kemaman rivers. It should be classified with *I. javanica multinervia* according to my criterion of the number of veins but the dark brown colour of the dried leaves and their coarse, conspicuous blackish venation is identical with that of *I. congesta* so that I am compelled to regard it as an aberrant form of this species. From the large flowered forms (7, 8) of *I. Lobbii* it differs in the elliptic, simply pointed leaves (not lanceolate-obovate and acuminate) the fewer, coarser veins and the blunt petals.

Form 11

Corolla-tube 2·5–3·8 cm. long, limb 2·5–3 cm. wide, petals ·6–·75 cm. wide, blunt to subacute, pale yellow turning light pinkish red.

Malayan Collections

Singapore; Corner. s.n. 25.1.37 (Reservoir Jungle).

I have noticed in Singapore that plants of this form generally flower after those of others forms of *I. congesta* at each seasonal flowering.

Sterile or Fruiting Specimens (not flowering)

Malayan Collections

Trengganu; Moysey 33308.
Perak; Cantley s.n.
Pahang; For. Dept. 15139.
Malacca; Alwins s.n., Goodenough s.n. 1892 (Tebau).
Johore; Holttum 9221, Lake & Kelsall s.n. 20.10.92, (K. Sembrong) Ridley 11164, s.n. 1900 (Minyak Buku).
Singapore; Cantley s.n., Burkill 709, 714 (det. *I. fulgens*), Hullett s.n. 1893 (Changi Road), Ridley 8410, s.n. 1889 (Selitar), s.n. 9.11.99 (Chua Chu Kang), s.n. 1901 (Yo Chu Kang).

I. finlaysoniana Don — Siamese White Ixora

Gen. Syst. 3, *1834*, p. 572.

A shrub, *commonly becoming a small tree* 5–6 m. high with stout trunk as thick as a man's leg and massive old branches: glabrous except for the very sparsely puberulous branches of the cyme.

Leaf-blade 6–16 × 2–6·5 cm., *rather small*, lanceolate elliptic to lanceolate obovate or almostly spathulate, *varying blunt to simply acute, the base very gradually attenuate, rather leathery: petiole* 4–8 mm. long, *short: stipular point* 1–2·5 mm. long, *short.*

Corymb 6–11 cm. wide, sessile or with a peduncle up to 1·5 cm. long, the branches articulate, *pale green*, dense, and sparsely puberulous, *flowers white, scented: bracts* 6–12 × 1·5–2·5 mm. *linear-lanceolate, pale green: bracteoles* 2–5 × ·5–1 mm. *linear: sepals* 3–5 × 1·5–2 mm., *oblong*, pointed or rather blunt, *glabrous, green-veined, longer than the ovary* (1 mm. long): *corolla-tube* 2–3·5 cm. long, glabrous, the mouth also glabrous, *pale greenish: petals* 5–7 × 2·5–3·5 mm., at first acute, becoming blunt with recurved edges, *white:* ovary often pinkish.

Distribution—India, Indo-China, Siam.
Type:—Wallich Cat. 6166.

This species is easily recognised from its tree-like habit, its narrow, often blunt, leaves with rather few veins and short petiole (as in *I. javanica*), the white fragrant flowers, linear bracteoles and oblong green-veined sepals exceeding the ovary in length. It is frequently cultivated in India, Indo-China, Siam and Malaya, and its native country appears to be Siam.

Specimens from the plants cultivated in the Singapore Botanic Gardens were compared recently with the Wallichian type of *I. finlaysoniana* by Mr. M. R. Henderson who reported that they matched very well. The Malayan plants also agree with Pitard's description of the species except that Pitard describes the leaves as larger, with more pairs of lateral veins (10–12) and the corolla with short tube (19–21 mm. long) and smaller petals (4–5 × 2–2·5 mm.) (Fl. Gen. Indoch. 3, p. 312). But, as in other Ixoras, I find that the flowers vary considerably in size in different collections, the larger-flowered forms being always the more desirable for cultivation.

The species has been received from India for cultivation in Singapore as *I. stricta* var. *alba* which it cannot be because of the long sepals and bracts and the fragrant flowers. I think it has yet to be proved that there is really a white-flowered variety of any red-flowered Ixora.

I. fulgens Roxb.

Hort. Beng. *1814*, 10. (name and citation of *Flamma silvarum* of Rumph. Herb. Amb. 4, p. 105, t. 46).
Typus:—*Flamma silvarum* of Rumphius loc. cit.

Interpretations:—

Roxburgh, Fl. Ind. 1, *1820*, p. 387.
Wallich, Cat. 6152.
Wight, Ic. Pl. I, t. 151.
Miquel, Fl. Ind. Bat. 2, *1857*, p. 264 (as *Pavetta fulgens*).
Hooker fil., F.B.I. 3, *1880*, p. 146.
Koorders and Valeton, Bijdr. Booms. Java 8, *1902*, p. 158.
King and Gamble, Mat. Fl. Mal. Pen. 4, *1904*, p. 79.
Merrill, Interpr. Rumph. Herb. Amb. *1917*, p. 487: Enum. Phil. Pl. 3, p. 548.
Pitard, Fl. Gen. Indoch. 3, *1924*, p. 325.
Craib, Fl. Siam. Enum. II, *1934*, p. 157.
Bremekemp, Journ. Bot. 75, *1937*, p. 111: Bull. Jard. Bot. Buit. ser. 3, 14, *1937*, p. 215.

From Roxburgh's description in the Flora Indica it is clear the binomial *I. fulgens* was made for a plant cultivated in the Royal Botanic Gardens at Calcutta, the plant having been introduced from the Moluccas. There is no specimen of Roxburgh's plant but a drawing of his which is that reproduced by Wight. There is also a collection of Wallich's 6152 which Wallich, who was Roxburgh's successor, identified with *I. fulgens*, and which was evidently seen and passed as such by Wight. Therefore, though Roxburgh's plant may have disappeared, it should be possible to determine what Roxburgh intended for *I. fulgens* from his drawing and from Wallich's specimens. Unfortunately, according to the Rules of Botanical Nomenclature, neither of these clues indicate what, taxonomically, must be intended by *I. fulgens*. The first publication of this binomial is in

Roxburgh's Hortus Bengalensis. This is accepted as a valid publication and, because a species can be validated merely by citation of a plate, Roxburgh's binomial *I. fulgens* which is without description is validated by reference to Rumphius' plate. Hence, taxonomically, the identity of *I. fulgens* hangs upon the identification of Rumphius' *Flamma silvarum*, about which no more is known than what Rumphius has written. Nevertheless, several interpretations have been made which I will now elaborate.

Roxburgh's own interpretation by his description and drawing, reproduced by Wight, is the first. It has been denied recently by Merrill and Bremekamp, after a century's acceptance, though I cannot discover that it has ever been amplified or critically examined in the light of modern systematics. Wallich's interpretation, by his collection 6152, has never been published, there being no description of his specimen: I imagine that his interpretation must coincide with Roxburgh's. Hooker's interpretation combines that of Roxburgh's and Wallich's (by quotation), with *I. Lobbii* by citation and by specimens (according to King and Gamble): it seems that the Ixoras which botanists now call *I. Lobbii*, Hooker called *I. fulgens*. Koorders and Valeton follow Hooker and make *Pavetta salicifolia* Bl. into a variety of *I. fulgens* in their sense (=*I. Lobbii*). King and Gamble deny Hooker's interpretation and, distinguishing *I. Lobbii* from *I. fulgens*, refer to *I. fulgens* a narrow-leafed Ixora which appears to be my *I. javanica retinervia* (at least, according to the collections Wray 3024 and Scortechini, cited by King and Gamble, and according to their description). Merrill (1918) arrived at no decision concerning the identity of *I. fulgens*, though he named as such the Amboina collection, Robinson 169: there is no description of the collection so that Merrill's interpretation is hid, like Wallich's, until the specimens be examined and described. Later, 1923, Merrill identified, without advancing reason, *I. congesta* Roxb. with *I. fulgens* Roxb., thus refuting Roxburgh's own interpretation: (the acute petals shown in Rumphius' plate ill suit the blunt ones of *I. congesta* described by Roxburgh). Pitard's interpretation is a copy of that of King and Gamble (*"teste* the misquotation of Wight's plate). Craib also follows King and Gamble and identifies a Siamese collection with *I. fulgens*. Most recently Bremekamp has given the problem a wholly new turn by remarking that "Roxburgh described this species [*I. fulgens*] from a plant cultivated in the Botanic Gardens, Calcutta. It was supposed to have been introduced from the Moluccas, but this was obviously a mistake, probably due to a superficial resemblance to the plant described and figured by Rumphius under the name

Flamma silvarum". Further, Bremekamp adds for the distribution of *I. fulgens* "Known with certainty from Tenasserim only"; and he seems to doubt Craib's identification of the Siamese plant. As regards Bremekamp's first point, if it is true, then he has discovered some information hitherto unknown to botanists, even to Roxburgh himself, which will give a different value to Roxburgh's interpretation, yet one cannot except such a bare contradiction without proof. But from Bremekamp's second point, it is clear that he has misunderstood the taxonomic intricacy of the identity of *I. fulgens* which can be determined, if at all, only from the Amboina-flora. Moreover, like that of Merrill and Wallich, his interpretation of *I. fulgens* must remain a mystery to botanists who cannot examine the specimens cited, because there is no description. (Such interpretations seem to me valueless and of the same category as *nomina nuda:* the essence of systematic botany being to classify plants with sufficient accuracy that other botanists may recognise them from the *published descriptions,* hence *nomina nuda* are illegal, and so, too, should be *interpretationes nudi:* the mere citation of specimens or expression of opinion should be as insufficient to validate the interpretation).

It must be remarked, now, that from King and Gamble onwards there has passed unnoticed a discrepancy between the description of *I. fulgens* given by King and Gamble and the descriptions of Roxburgh and Rumphius. King and Gamble give the leaves of *I. fulgens* as $3\frac{1}{2}$–$5\frac{1}{2} \times 1\frac{1}{4}$–$1\frac{1}{2}$": Rumphius gives 8–12 × 2–$3\frac{1}{2}$", for *Flamma silvarum:* and Roxburgh gives 6–8 × 1–3". I think that it is extremely improbable that *I. fulgens sensu* King and Gamble, with such small narrow leaves, should be identical with Flamma silvarum of Rumphius. Hence, it is evident that the interpretation of *I. fulgens* by King and Gamble and also those by Pitard, Craib and Bremekamp, who cite King and Gamble are doubtful. Bremekamp's interpretation is rendered yet more uncertain because he has not followed up the clue to Roxburgh's interpretation which the Wallichian specimens must afford.

I. fulgens Roxb. has therefore been interpreted as *I. Lobbii, I. congesta* and *I. javanica,* the three common species of Western Malaysia, from which I conclude that it is still an unknown species awaiting identification by a resident of Amboina. However, I may give my own interpretation which is that my *I. javanica* form 7 is the Rumphian plant, for the following reasons.

There is no record how this form 7 which is the Common Red Ixora of Malayan gardens, was introduced to

Malaya but it has evidently been in cultivation for very many years. It agrees so well with Roxburgh's description and drawing as well as with Rumphius' that I can find no discrepancy: it also has large leaves, 4–11 × 1¾–4¾" and, as Roxburgh remarks, it blossoms most part of the year. Wallich's collection 6152a came from Penang and/or Singapore; it agrees presumably with Roxburgh's drawing; it may even have been our Common Red Ixora because there is no other common big-leafed Ixora with red, pointed petals in Penang or Singapore. Now, if Roxburgh's plant of *I. fulgens* came from the Moluccas, is it not likely that this same species was brought by the early travellers to other countries and to what place more likely than Penang, especially on its way to India? Rumphius called his other red Ixora, *Flamma silvarum peregrina*, for the very reason that it had been widely dispersed and cultivated by travellers so early as the seventeenth century. If this be so, then we shall have the explanation of the origin of our common garden plant and it will be necessary to reduce *I. javanica* to *I. fulgens*.

Some Collections determined as I. fulgens

Merrill 1362 (Palawan) is *I. Lobbii* var. *stenophylla* form 10.

Moulton 78 (Borneo) is *I. Lobbii* form 8.

Ridley 8970 (Sumatra) is *I. Lobbii* form 5.

Wray 3024 (Perak) is *I. javanica* var. *retinervia*.

I. grandifolia Zoll. et Mor. Pink River Ixora

Syst. Verz. *1846*, p. 65 (= *Pavetta macrophylla* Bl.). Synonyms:—

Pavetta odorata Bl., Bijdr. *1825*, p. 952 (haud *I. odorata* Spreng., Syst. Veg. I. *1825*, p. 407).

Pavetta macrophylla Bl., Bijdr., *1825*, p. 953 (haud *I. macrophylla* DC. Prodr. 4, *1830*, p. 487).

Ixora Blumei Zoll. et. Mor., Syst. Verz. *1846*, p. 65. (= *P. odorata* Bl.).

? Pavetta Teysmanniana Miqu., Fl. Ind. Bat. 2, *1857*, p. 267 (fide Hooker fil, F.B.I. p. 143).

? Pavetta macrocoma Miqu., loc. cit. p. 274 (fide Hook. fil., loc. cit.).

? Ixora arborescens Hassk., Retzia I, *1858* p. (? 22) (fide Hook. fil., loc. cit., et Koorders et Valeton, Bijdr. Booms. 8, p. 150).

Ixora macrosiphon Kurz., Journ. Bot. I, *1875*, p. 327 (fide Hook. fil., loc. cit.).

Ixora rosella Kurz., For. Fl. Burma II, *187*, p. 23 (fide Hook. fil., loc. cit.).

Ixora odorata (Bl.) K. et V., Bijdr. Booms. Java, No. 8, *1902*, p. 165.

Ixora coriacea Ridley, Journ. St. Br. R. As. Soc. 79, *1918*, p. 83: Fl. Mal. Pen. II, 1923, p. 98 (= *I. elliptica* Ridley).

Ixora crassifolia Ridley, loc. cit. p. 83: Fl. Mal. Pen. II, p. 98. (haud *I. crassifolia* Merrill, 1910).

Ixora fluminalis Ridley, loc. cit. p. 84: Fl. Mal. Pen. II,

p. 97.

Ixora gigantea Ridley, loc. cit p. 84.
Ixora elliptica Ridley, Fl. Mal. Pen. II, *1923*, p. 98.
Ixora Ridleyi Merrill, Gard. Bull. 8, *1935*, p. 132.
Ixora lancifolia Ridley, Journ. Bot. 72, *1934*, p. 256.
Ixora Valetonii Hochr., Candollea 5, *1934*, p. 261.

Varieties

var. *coriacea* Hook. fil., F.B.I., III, *1880*, p. 143.
var. *arborescens* Hook. fil., loc. cit.
var. *Kurzeana* Hook. fil., loc. cit.
var. *rosella* Hook. fil., loc. cit.
var. *gigantea* King and Gamble, Mat. Fl. Mal. Pen. 4, *1904*, p. 156.
var. *acutifolia* Hochr., Candollea 5, *1934*, p. 257.
var. *lancifolia* **var. nov.**

A shrub or tree up to 20 m. high, often flowering as a spindly bush 1½–5 m. high: *twigs pale, greyish white or silvery buff:* glabrous except the puberulous panicle and often puberulous style.

Leaf-blade 10–32 × 4–18 cm., *rather large to very large, elliptic, often inclined to ovate,* the apex blunt or acute, the base cuneate, rounded or even cordate, *more or less coriaceous;* primary lateral veins 6–16 pairs, directed obliquely forward, inarching near the edge, with coarse faint reticulations, *the venation generally visible on both sides of the dried leaf:* petiole ·6–3·5 cm. long, stout: stipules 5–12 mm. long, broadly triangular with a minute point, generally more or less sheathing.

Corymb 12–23 cm. wide, erect, *sessile, with 3 main, long-stalked branches from the base,* the peduncles of the branches generally 5–9 cm. long, the *branchlets not articulate,* green flushed reddish, the corymb falling entire: *flowers crowded, some sessile, others shortly stalked, fragrant or not: sepals shorter than the ovary,* blunt to subacute: *corolla-tube* ·6–3 cm. long, *pink or reddish: petals* 4–5·5 mm. long, 1·5–2·5 mm. wide, *oblong, blunt or subacute, reflexed along the tube,* not spreading, *white,* often tipped pink: anthers yellow: *style* projecting 3–5 mm. *glabrous or the part in the corolla-tube more or less hairy,* white.

Berries 10–12 mm. wide, subglobose, distinctly longitudinally sulcate when dried, green turning red then black.

Distribution:—Burma, Indo-China, Andaman and Nicobar Islands, Malaya, Sumatra, Java, Borneo, Philippines, ? Celebes.

var. **lancifolia** var. nov. Marsh Ixora

Frutex vel arbor minor, vix ramosus, usque 5 m. altus.

Lamina 20–36 × 3·5–12 cm., *lanceolata,* linearis (30 × 3·5 cm.) vel lanceolato-obovata, obtusa vel subacuta, *utrinque gradatim attenuata* praecipue basim versus, *carnoso-subcoriacea, subtus sicco minute papilloso—rugulosa, nervis reticulatis haud distinctis,* costis lateralibus utrinsecus 10–14.

Corymbus 8–16 cm. latus, *semper minor,* ramis 3 breviori-bus pedunculo 1·5–5 cm. praeditis: corollae tuba 12–16 mm. vel 17–20 mm. longa.

Distribution:—Malaya, Sumatra.

Typus:—Ridley 2213 (Tahan River, Pahang).

That *I. grandifolia* is a variable species can be judged from the list of synonyms, as well as from the number of forms which I have distinguished. As it grows in Malaya, the species could be split into six or seven according to the inadequacy of the herbarium material, for one sheet typical of each form might be considered a species. However, from the numerous collections in the Singapore Herbarium and from the numerous plants which I have studied in the forest, I have discovered that these forms are by no means clearly defined and that with our present knowledge the subdivision of *I. grandiflora* is impossible. Indeed, in the wide sense, it is easily and conveniently recognised as a common species of swampy forest in Western Malaysia. In this sense, the species was understood by Hooker, King and Gamble; and so too by Koorders and Valeton, except for their separation of *I. odorata* (Bl.). Recently, for reasons which appear to me wholly inadequate as well as conflicting, Ridley has divided the species into six. As in the red-flowered Ixoras, the variability of *I. grandifolia* is not yet appreciated.

For the legitimate name of the species in this wide sense I have adopted *I. grandifolia*. The alternative, simultaneous name *I. Blumei* I have made the synonym because it is not well-known while the first is. Both these names of Zollinger and Moritz were proposed for Blume's two species without any reason being given, though evidently because Blume's specific names would make later homonyms in the genus Ixora—a point overlooked by Koorders and Valeton in their *I. odorata* (Bl.). For the interpretation of the species of Blume, Miquel, Hasskarl and Kurz, I have followed Hooker, Koorders, Valeton, King and Gamble, having no access to the types. Ridley's species I have been able to examine personally in Singapore.

As regards *I. grandifolia*, in the wide sense, the variability of the leaves in shape and venation has not been properly explained and it seems that the variability in the length of the corolla-tube, in the fragrance of the flowers and in the hairiness of the style is not realised at all: there is confusion also about the colour of the flower. That some trees have pointed and others blunt leaves I am certain from the numerous trees of my form 3 which I have studied in the East of Johore, but some collections are intermediate. The number of veins is also a fairly constant distinction but also imperfect through the occurrence of specimens with 9–12 pairs of lateral veins: unfortunately, because of the large size of the inflorescence, herbarium-specimens generally have only one or two pairs of leaves on the twig below the panicle and these uppermost leaves of the twigs

are commonly reduced. As for the leaf-base it varies greatly: even on the same plant, I have seen leaves with gradually tapered, cuneate, rounded and cordate bases, so that one unacquainted with the living trees might well make four species from separate leaves of the same plant. Concerning the texture of the leaf, I think there is great variability which cannot be used satisfactorily in defining varieties because of the numerous intergrades, with the one exception of var. *lancifolia* in which the texture is accompanied by other peculiarities. That the length of the corolla-tube is no sign of specificity is obvious from the fact that there are specimens differing only in this one character. And, likewise, regarding the hairiness of the style which I find to be as often rather sparsely puberulous as glabrous: (this point cannot be determined without pulling the style from the flower because it is the part of the style in the corolla-tube which is hairy). The colour of the flower may be described generally as white or pink, according as the corolla is open or not. When the flowers of a corymb are not yet open they look pink because the reddish pink corolla-tubes are conspicuous: but when the flowers open, the white petals are reflexed, concealing the corolla-tubes almost completely. Thus, I believe, have arisen the 'conflicting' statements of the flowers as white or pink, just as with *I. pendula*. The flowers are generally very fragrant but I have seen several trees in Johore (my form 3, as 32277) which had scentless flowers. I think this as important a varietal character as any other in the species, though it is one that will not commend itself so long as we are limited to dried specimens.

As regards *I. odorata* (Bl.) K. et V., the authors of the combination say that from *I. grandifolia* it is "toto coelo diversa (N.B. fructus valde diversi)". Nevertheless I am unable to follow them. The fruit of *I. grandifolia* they describe as 6-12 mm. wide and distinctly divided in 2 lobes, or didymous: that of *I. odorata* they describe as only 6–7 mm. wide and long, globose and never didymous, although in their plate (Baumart. v. Java, fig. 554) a slightly didymous fruit is shown. I find that the normal 2-seeded ripe fruits of *I. grandifolia* are 10–12 mm. wide and, when dried, are distinctly didymous as is general in Ixora, but that immature fruits 4–8 mm. wide, even when dried, do not show a longitudinal sulcation between the two seeds. Hence I conclude that Koorders and Valeton drew their opinion from immature fruits. But these authors also distinguish *I. odorata* by its short corolla-tube and hairy style. But as I have said, these characters vary much in different collections of *I. grandifolia* which in other respects are

identical. It seems a little fastidious, moreover, to distinguish two species of tree solely on the hairiness of the filiform style. *I. odorata* (Bl.) K. et V. is my *I. grandifolia* form 1: and *I. grandifolia* sensu K. et V. consists of my form 5 and my form 2 (as shown by the figure, Baumart. v. Java. fig. 545, in which the leaves are drawn with few lateral veins).

Hooker's varieties, as amplified by King for the Malayan flora, I interpret in this way. The var. *gigantea* is based on the size, shape and texture of the leaf and so it covers my form 2 (Ridley 4120), form 3 (Curtis 3384), form 4 (Wray 2973, 3971) and form 5 (King's coll. 5609, 10294, Wray 3678). The var. *coriacea*, based on the more or less lanceolate, very coriaceous leaf, covers my form 5 (Curtis 2486, Wray 2140) and, perhaps, var. *lancifolia* (Ridley 2213, which King doubtfully referred to var. *coriacea*). The var. *arborescens* covers my form 1 (Derry 310) and form 2 (Derry 571, King's Coll. 4686, Ridley 4165). The var. *rosella* may be my form 3, on account of its pointed leaves, but Kurz describes the corolla-tube "about an inch long", though Hooker gives $\frac{1}{2}-\frac{2}{3}$". It seems to me that the varieties *gigantea, coriacea* and *arborescens* are unsatisfactory because from their definitions so many variable features have been omitted though it may be possible to define accurately var. *arborescens* and var. *coriacea* from the single, and therefore the type, specimens cited for each by Hooker.

As regards *I. macrosiphon* Kurz (= *I. grandifolia* var. *Kurzeana* Hook. fil), it differs from *I. grandifolia* only in the longer corolla-tube (2·5–3 cm. long) and my form 6 connects the two, having the tube 1·7–2 cm. long. The three collections of *I. macrosiphon* in the Singapore Herbarium leave no doubt that it is conspecific. These collections, which are cited by King and Gamble as var. *Kurzeana* are:—King's Collector 277, s.n. 3.3.94, Prain's Collector s.n. 1899 (all from the Andamans). The variety has not been found in Malaya, though it probably occurs.

Ridley's species are hard to understand through the different treatment which he has given them in his Flora and his previous paper. Thus *I. coriacea* of his paper (1918), based on Wallich 6151 which is the type of *I. grandifolia* var. *coriacea* Hook., is assigned to both *I. crassifolia* and *I. elliptica* in his Flora, while *I. gigantea* of his paper (starting in the middle of line 8 from the top of p. 84) which is there said not to be true *I. grandifolia* of Zollinger, is omitted from the Flora, though under *I. grandifolia* of the Flora it is remarked that var. *gigantea* King and Gamble "is a typical form" of the species.

I. coriacea Ridley, based on Wallich 6151, is evidently my form 5, according to Ridley's description, and this agrees with King's interpretation of var. *coriacea* Hook. (also based on Wallich 6151). In his paper, Ridley doubtfully refers Wallich 6153 to *I. coriacea*, but in his Flora he refers both Wallichian collections to *I. elliptica*. As the specific names "coriacea" and "elliptica" are manuscript names of R. Brown taken up by Ridley, it follows that *I. elliptica* ex Ridley is an exact synonym of *I. coriacea* ex Ridley. I may add that both Hooker and King regarded Wallich 6153 as typical *I. grandifolia*.

I. crassifolia is based firstly, in the paper (1918), on a specimen of Griffith's from Ayer Panas in Malacca and to it, in the Flora, Ridley assigns many other specimens as well as var. *coriacea* Hook. It is possible that this collection of Griffith's should be taken as the basis of var. *arborescens* Hook., but Griffith's specimens are not available in Malaya. In any case, Griffith's specimen is the type of *I. crassifolia* and, from Ridley's original description, I find it hard to distinguish from *I. coriacea*: it is said to have a blade 8–9 × 3–3½″ with a blunt base. *I. crassifolia* of Ridley's Flora is said to have a blade 13 × 3″, lanceolate and narrowed to both ends, as my var. *lancifolia*, and the cited collections, which I can check for certain in Singapore, namely G. Janeng (Kelsall), Tahan River and Pekan, are my var. *lancifolia* to which Griffith's specimen from Ayer Panas cannot belong if Ridley has correctly described it. Hence, I have no hesitation in making the new variety *lancifolia*, for it is not covered by the original definition of any of Ridley's species or of Hooker's and King's varieties.

I. Ridleyi Merrill was proposed for *I. crassifolia* Ridley, which is a later homonym of *I. crassifolia* Merrill. Merrill merely cited Ridley's references so that he threw but another cloud over the problem.

I. fluminalis, as originally described, covers my form 1 (Derry, s. Rumbai), form 2 (Ridley 4165; Kunstler, Goping) and form 5 (Haniff 4049). It represents the common forms of *I. grandifolia* with leathery blunt leaves. A distinction of seeming importance between *I. fluminalis* and *I. grandifolia* which must occur to the reader studying Ridley's description is that *I. grandifolia* is said to have white flowers and *I. fluminalis* yellow. The corollas of both, however, have the white limb and pink tube typical of *I. grandifolia*. The reason for ascribing yellow flowers to *I. fluminalis* seems to have been the field-note of Kunstler's collection 4686, the "yellow flowers" of which refer, however, to the tiny calyces from which the corollas have

dropped. The distinction in flower-colour, of white or pink, given by Ridley for his species depends on whether the flowers of the specimen were open in which case they would have looked white, the reflexed limb concealing the corolla-tube, or not open, the pink tube then being more striking. It seems, in any case, that *I. fluminalis* must be discarded. Ridley based his species on "*I. grandifolia* var. *arborescens* King not *I. arborescens* Hassk." By this, Ridley meant var. *arborescens* Hook. fil in the definition of which Hasskarl's *I. arborescens* was directly cited. In other words, taxonomically, *I. fluminalis* Ridley is *I. grandifolia* var. *arborescens* Hook. fil. which is *I. arborescens* Hassk. with Hasskarl's plant as the type of each.

A specimen of Haviland's collection 2157, which is the type of *I. lancifolia* Ridley, in the Singapore Herbarium shows this species to be identical with the small-flowered, few-veined *I. Blumei* which is my *I. grandifolia* form 1.

I. timoriensis is very close to *I. grandifolia* but it differs in the laxer inflorescence with fewer flowers, all of which are distinctly pedicellate, and in the hairy corolla-mouth. I should be inclined to consider it as a variety, in which case it would be the legitimate name for the species.

KEY TO THE FORMS AND VARIETY OF *I. GRANDIFOLIA*

Leaves lanceolate, very gradually tapered to the base, the reticulations invisible in the dried leaf, and the undersurface finely wrinkled .. .. var. *lancifolia*
Leaves more or less elliptic: reticulations visible: undersurface even
  Leaves with 6–10 pairs of side-veins: blade up to 9 cm. wide
    Corolla-tube ·6–·9 cm. long .. .. Form 1
    Corolla-tube 1–1·2 cm. long
      Leaf-blade blunt .. .. .. Form 2
      Leaf-blade acute .. .. .. Form 3
  Leaves with 10–16 pairs of side-veins: blade 7–18 cm. wide
    Corolla-tube ·7–1·0 cm. long .. .. Form 4
    Corolla-tube 1–1·2 cm. long .. .. Form 5
    Corolla-tube 1·7–2·0 cm. long .. .. Form 6
    Corolla-tube 2·5–3 cm. long .. .. (var. *Kurzeana*)

Form 1

Leaves with 6–10 pairs of lateral veins, acute, subacute or blunt, 3·5–9 cm wide.

Corolla-tube short 6–9 mm. long.

Malaya

Pahang; Cons. For. 3603.
Negri Sembilan; Alvins s.n. (S. Ujong).
Malacca; Alvins 2254, 2332, Derry 310 (det. *I. grandifolia* var. *arborescens* by King).

Bornean Collections

Carr 26520, For. Dept. B.N.B. 4721, Wood 2033.
Haviland 1673 (det. *I. fluminalis*), Omar 395 (det. *I. fluminalis*).
Haviland 2157 (det. *I. lancifolia*).

Javan Collections

v. Steenis 2415 (det. *I. odorata* and *I. Blumei*).

Two forms might be made of this one, as in Forms 2 and 3, according as the leaves are blunt or acute. But my object is merely to explain the variety.

Form 2

Exactly as *Form 3* but the leaves blunt.

Malayan Collections

Perak; King's Collector 4686 (det. *I. grandifolia* var. *arborescens* by King).

Pahang; For. Dept. 15659, Burn Murdoch 200 (no flowers: det. *I. concinna*).

Malacca; Derry 571.

Johore; Corner 25892, 28628, s.n. 3.4.34 (S. Kambau pr. S. Sedili), Ridley 4165 (det. *I. grandifolia* var. *arborescens* by King), 13490, 15387.

Singapore; Ridley 4120 (det. *I. grandifolia* var. *gigantea* by King).

Sumatra Collections

Boden-Kloss 14567 (Siberut: det. *I. coriacea*).

Javan Collections

Koorders 34368, Teysmann 18651 (det. *I. macrophylloides* and *I. fluminalis*).

(Koorders et Valeton, Baumart. v. Java fig. 545).

Form 3

Leaves 3·5–9 cm. wide, the apex acute and generally accuminate with a tip 6–12 mm. long: lateral veins 6–10 pairs, the reticulations often very faint.

Corolla-tube 1–1·2 cm. long, the petals 3–4·5 × 1·5–2 mm. blunt.

Malayan Collections

Kedah; For. Dept. 17890.

Penang; Curtis 3384 (det. as *I. grandifolia* var. *gigantea* by King).

Malacca; Alvins 797.

Johore; Corner 32052, 32277, 32498, s.n. 11.4.36 (S. Kayu, pr. S. Sedili).

Sumatran Collections

Boden-Kloss 14669 (Sipora Il.), Krukoff 4088, 4207, 4328.

Bornean Collections

J. & M. S. Clemens 26255, 31294.

Form 4

As Form 5 but the corolla-tube 7–10 mm. long.

Malayan Collections

Perak; Wray 2973, 3971 (both det. *I. grandifolia* var. *gigantea* by King).

Sumatran Collections

Bartlett 2887.

Javan Collections

s.n. cult. Hort. Bog. XIII (det. *I. odorata*).

Form 5

Leaf-blade 7–18 cm. wide, blunt, with 10–16 pairs of side-veins: petiole 1·5–3·5 cm. long.

Corolla-tube 1–1·2 cm. long.

Siamese Collections

Haniff and Nur 4049 (det. *I. fluminalis* Ridley by Craib).

Malayan Collections

Kedah; Haniff 15480 (det. *I. fluminalis* Ridley by Craib), 21020.
Penang; Curtis 2486 (det. *I. grandifolia* var. *coriacea* by King).
Perak; King's Collector 5609, 10294 (both det. *I. grandifolia* var. *gigantea* by King), Wray 2140 (det. *I. grandifolia* var. *coriacea*), 3678 (det. *I. grandifolia* var. *gigantea* by King).
Pahang; For. Dept. 17133.
Negri Sembilan; Alvins 1177.
Johore; Corner 28578, s.n. 11.10.36 (S. Kayu, pr. S. Sedili), Henderson 28419, Kiah s.n. 6.10.36 (S. Kayu, pr. S. Sedili), Lake and Kelsall s.n. 22.10.92 (G. Janing).

Sumatran Collections

Krukoff 4397.

Bornean Collections

For. Dept. B.N.B. 4302 (Brunei), Wood 2121.

Form 6

As form 5 but the corymb smaller and denser, 10–13 cm. wide, with the peduncles of the main branches 2·5–4 cm. long: *corolla tube longer*, 1·7–2 cm., the petals ·5 cm. long, blunt to subacute.

Malayan Collections

Johore; Kiah s.n. 6.10.36 (S. Kayu, pr. S. Sedili).

The length of the corolla-tube in this form bridges the gap between *I. grandifolia* and var. *Kurzeana* (= *I. macrosiphon* Kurz) in which it is 2·5–3 cm. long.

var. **lancifolia** Corner

Malayan Collections

Kelantan; Nur and Foxworthy 11953.
Trengganu; (Kemaman), Corner 30719, s.n. 13.11.35 (2 sheets).
Pahang; Burkill s.n. June 1915 (Pulau Tioman), Ridley 2213, (det. *I. grandifolia* var. *coriacea* by King), s.n. 1891 (Pengkalan Kasai), s.n. 1893 (Taka Tahan).
Negri Sembilan; Burkill 4478.
Malacca; Alvins s.n. (5 sheets), 2081, 2153, 2224, Derry 67.
Johore; Corner s.n. 9.3.36, s.n. 10.4.36 (Ulu Segun, Gunong Panti), Holttum 9282, Kiah s.n. 12.10.36, s.n. 6.3.37, Lake and Kelsall s.n. 21.10.92 (G. Janing), Nur 19988, Ridley s.n. Jan. 1910 (Panti River, Kota Tinggi).

Sumatran Collections

Bartlett 7479 (pr. Loemban River, Asahan).
Forbes 1986 (det. *I. grandifolia* var. *coriacea* by King).

COLLECTIONS INTERMEDIATE BETWEEN *I. GRANDIFOLIA* AND VAR. *LANCIFOLIA*

Kelantan; Haniff and Nur 10090.
Perak; Derry s.n. 1899 (Maxwell Hill, det. *Tarenna grandifolia*), King's Collector 5935 (det. *I. grandifolia* var. *coriacea* by King).
Pahang; Henderson 22416 (det. *I. crassifolia*), For. Dept. 41042.
Selangor; For. Dept. 16904 (det. *I. crassifolia*).

I. javanica (Bl.) DC — Javanese Ixora

emend. Koorders et Valeton, Bijdr. Booms. Java 8, *1902*, p. 160.

Basinym:—*Pavetta javanica* Bl., Bijdr. *1826* p. 949.

Synonyms:—

Ixora stricta auctt. non. Roxb.

I. fulgens auctt. non. Roxb.

I. amoena Don, Gen. Syst. 3, *1834*, p. 571.

I. stricta var. *amoena* Ridley, Fl. Mal. Pen. 2, *1923*, p. 94.

I. aurorea Ridley, Journ. Bot. 72, *1934*, p. 251.

Icones:—

Bot. Mag. t. 4586.

Baumart. Java 4, t. 553.

An evergreen shrub or small tree to 8 m. high, the trunk 1–8 cm. thick, with smooth brown bark: glabrous.

Leaf-blade 5–25·5 × ·8–11·5 cm., *elliptic*, varying narrowly elliptic to lanceolate in riverside forms, *simply acute* or at most subacuminate, *the base varying from gradually tapered and narrowly cuneate to rather suddenly rounded*, widest about the middle, the proximal half often wider than the distal, membranous to subcoriaceous or distinctly coriaceous in some cultivated forms, *rather dull green*, often light or yellowish green: *lateral veins* 6–14 pairs, generally 6–10 or 9–13, inclined obliquely forward and without distinct marginal loops or in var. *retinervia* distinctly inarching: *petiole* ·25–1·5 cm. long: *stipular point* ·1–·75 cm. long, longest in the narrow-leafed riverside forms.

Corymbs 3·5–20 cm. wide, with peduncles 0–9 cm. long, *the branches articulate and coral-red:* sepals blunt to subacute, variable in the same flower: *corolla-tube* 2–5 cm. long, the limb 1–3·8 cm. wide, the petals varying blunt to acute.

Berries 1·2–2 cm. wide, depressed globose, ripening red then black, 1–2 seeded.

Distribution:—India, China, Siam, Malay Archipelago.

var. **multinervia** var. nov.

costis lateralibus utrinsecus 9–14, marginem versus non arcuato-connexis: lamina usque 25·5 × 11·5 cm., non vel vix acuminata.

Typus:—Corner 33438 (Kota Bahru, Kelantan, 22.4.37).

var. **paucinervia** var. nov.

costis lateralibus utrinsecus 6–9 (–10), marginem versus non arcuato-connexis: lamina usque 15·5 × 7·8 cm., non acuminata.

Typus:—Burkill and Haniff 17342 (Telok Sisek, Pahang, 4.12.24).

var. **retinervia** var. nov. — Ixora Lotong

costis lateralibus utrinsecus 7–12, *marginem versus conspicue arcuato-connexis*, costa media angulo lato excurrentibus: *lamina* 6–15·5 × 1·7–5·8 cm., elliptica vel oblongo-elliptica, *plus minus accuminata.*

Typus:—Corner 29020 (E. Johore, 9.2.35).

KEY TO THE VARIETIES

Lateral veins of leaf making a wide angle with the midrib, *conspicuously inarching with wide loops near the margin: leaf-blade generally more or less acuminate, up to 15 × 5·5 cm.* ..	var. *retinervia*

Lateral veins of leaf inclined obliquely forward, not distinctly inarching: leaf-blade not acuminate
Lateral veins 6–9 (–10) pairs; blade up to 15 × 5·5 cm. .. .. .. var. *paucinervia*
Lateral veins 9–14 pairs: blade up to 25 × 11 cm. .. .. var. *multinervia*

There is much confusion over the nomenclature of the Malayan plants which I refer to *I. javanica*. They have been called *I. stricta* Roxb. until recently when Ridley has made them a new species, *I. aurorea*, and Burkill has referred them to *I. chinensis* Lam. (Dict. Econ. Prod. Mal. Pen. 1935). But, as I have explained under *I. chinensis*, *I. stricta* Roxb. is to be interpreted as a synonym of *I. chinensis*, which differs from the Malay specimens in its very short petiole and very blunt petals so that, provided this distinction is held, the Malayan specimens are not *I. chinensis*. I find that they agree exactly in all essentials with *I. javanica* as interpreted by Koorders and Valeton for the Javanese flora. Craib identified them with *I. amoena* but, as I have shown under that species, I can find no difference between it and *I. javanica*. Ridley's latest interpretation I consider no solution because it deals with very few specimens and, while resting on such extremely variable features as the size of leaf, stipule, corymb and corolla and the shape of sepals and size of corolla-tube, it ignores differences in the venation, the shape and size of the petals, and the colour of the flowers, and omits the common Red Ixora of Malayan gardens and villages.

I. javanica is the commonest and most variable Ixora in Malaya. I have distinguished 3 varieties and 30 forms so that the variation may be perceived. The one which I have found to be most constant is var. *retinervia*, which has not been recognised previously, yet there are intermediates between them all. Until the species has been studied genetically, I do not see how it can be dissected profitably in the herbarium.

I. pseudojavanica Bremekamp, *I. ovalifolia* Bremekamp and *I. lacuum* Bremekamp (Journ. Bot. 75, *1937*, pp. 170–171) are to me only forms of *I. javanica*. Such "splitting" is quite impracticable.

var. **retinervia** var. nov. . Ixora Lotong

The Malayan specimens are remarkably constant in having rather small, subacuminate glossy leaves, drying dark-brown, fuscous or even black, inarching veins often making almost a right angle with the midrib, small corymbs 4–9 cm. wide and small corollas (tube 3–4 cm. long; limb 1–1·6 cm. wide; petals ·25–·3 cm. wide, oblong or subelliptic, more or less acute, light orange-yellow turning scarlet or

deep red.). One might, therefore, regard the variety as a species but there are several collections intermediate with var. *paucinervia* and as these lack the full characteristics of var. *retinervia* I have classed them with var. *paucinervia*. The variety *retinervia* also resembles *I. Lobbii* var. *stenophylla* in the Herbarium: the distinctions are given under *I. Lobbii*. Compare also *I. concinna*.

It appears that there are forms of this variety in Borneo which have not only larger flowers but leaves which dry pale. The systematic position of these Bornean specimens, which I have listed below, is problematical because they resemble also *I. Robinsonii*. Many more collections will be needed to establish their status from their variability.

Malayan Collections

Penang; Curtis 1112 (det. *I. stricta* by King), s.n. B. Laksamana March 1890, (det. *I. stricta* var. *amoena* by King): For. Guard. 1112.
Perak; Wray 3024 (det. *I. fulgens* by King).
Pahang; Burkill 15704, 17229; Henderson 22009; Ridley 2226, 2227, 16243 (det. *I. concinna*); Strugnell 23453.
Trengganu; Moysey 33643.
Selangor; Burkill 6842.
Negri Sembilan; Holttum 9609; Kloss s.n. B. Tangga 1910; Nur 11669; Ridley s.n. G. Angsi, Feb. 1900.
Malacca; Alvins 62, 567, s.n. 29.1.86; Derry 257; Goodenough 1753, 1826.
Johore; Best 7717; Corner 29020, 29939; Goodenough s.n. 1893; Ridley 10940 (? 16940), s.n. 1892, s.n. 1898, s.n. 1906 (? 1908).
Singapore; J.S.G. 3999, 5004; Ridley s.n. 1904.

Bornean Collections

? Winter 2154 (S.E. Borneo, 1908), det. *I. amoena:* (the inarching of the veins not always distinct): (det. *I. Winkleri* Brem. Bull. J. Bot. Buit., XIV, *1937*, p. 266).

? Kloss 19136, For. Dept. B.N.B. 4256, 4276 (all det. *I. stenophylla*): corolla-tube 3–3·8 cm. long, limb 2·5–3 cm. wide, petals ·6–·75 cm. wide.

? For. Dept. B.N.B. 4037: corolla-tube 3·7–4·3 cm. long, limb 2·5–3·3 cm. wide, petals ·5–·6 cm. wide.

KEY TO THE FORMS OF *I. JAVANICA* VAR. *MULTINERVIA*

Corolla-tube 2–3 cm. long	
Limb 1–1·5 cm. wide	
Petals ·5 cm. wide, blunt, yellow then pinkish orange	Form 1
Petals ·3 cm. wide, pointed, rich yellow then intense brick-red	Form 2
Corolla-tube 3–3·8 cm. long	
Limb 2·5–3·8 cm. wide	*I. congesta* Form 10
Limb 2·3–2·5 cm. wide	Form 4
Limb 2–2·3 cm. wide: petals acute	Form 9
Limb 1·5–2 cm. wide	
Petals blunt,	
Petals ·5–·6 cm. wide	Form 5
Petals ·3–·5 cm. wide	Form 6

Petals acute, ·5 cm. wide
Petals turning deep brick-red .. .. Form 7
Petals pale orange buff then pale red .. Form 8
Limb 1–1·5 cm. wide: petals subacute
Petals ·3–·4 cm. wide .. .. .. Form 10
Petals ·2 cm. wide, narrowly oblong .. .. Form 11
Corolla-tube 3·8–4·3 cm. long
Limb 1·2–1·5 cm. wide
Petals ·3 cm. wide, salmon pink .. .. Form 12
Limb 1·7–2·3 cm. wide
Petals ·5–·6 cm. wide, acute: (leaves narrow, 2·5–6·5 cm. wide) .. .. Form 13
Petals ·3–·4 cm. wide, blunt
Petals yellow then brick-red .. .. Form 14
Petals pale reddish pink (leaves 2·5–3·8 cm. wide) .. .. Form 15
Limb 2·3–2·5 cm. wide
Petals ·6–·7 cm. wide, acute, pale yellow then salmon pink .. .. Form 16

KEY TO THE FORMS OF *I. JAVANICA* VAR. *PAUCINERVIA*

Flowers yellow, not reddening: "Yellow Javanica"
Corolla-limb 1·5–1·9 cm. wide .. .. .. Form 17
Corolla-limb 2–2.5 cm. wide .. .. .. Form 18
Flowers yellow turning red or pink
Flower pale yellow turning pale clear pink: "Pink Javanica" .. .. Form 19
Flower turning orange red to brick-red; "Red Javanica"
Corolla-tube 2–2·8 cm. long
Limb 1–1·5 cm. wide
Petals blunt: leaves thin .. .. Form 20
Petals subacute: leaves coriaceous .. Form 21
Limb 1·8–2·3 cm. wide: petals blunt .. Form 22
Corolla-tube 2·5–3·8 cm. long
Limb 1–1·3 cm. wide: petals ·2 cm. wide, subacute .. .. Form 23
Limb 1·3–1·8 cm. wide
Petals ·3–·5 cm. wide, blunt or subacute .. Form 24
Limb 1·8–2·2 cm. wide
Petals pointed
Petals ·3–·5 cm. wide, elliptic .. Form 25
Petals ·2–·3 cm. wide, oblong .. Form 26
Petals blunt, ·4–·6 cm. wide .. .. Form 27
Limb 2–2·5 cm. wide: petals ·4–·6 cm. wide, acute .. .. Form 28
Corolla-tube 3·8–5 cm. long: petals ·3–·5 cm. wide, acute
Limb 1·7–2 cm. wide .. .. Form 29
Limb 2–2·5 cm. wide .. .. Form 30

Form 1

Corolla-tube 2–3 cm. long, the limb 1–1·5 cm. wide: petals ·5 cm. wide, blunt, yellow then pinkish orange.

Malayan Collections

Kelantan; Corner 33443.
Penang; Ridley s.n. 1900 (P. Tikus).
Trengganu; Rostado s.n. Feb. 1904.
Singapore; (cult. in Hort. Bot.) Corner 30795 (det. *I. congesta*), Nur s.n. 14.6.29 (det. *I. congesta*).

Siam

Keith 129 (det. *I. amoena* by Craib).

The two Singapore collections have coarsely veined leaves like *I. congesta* but only 10–13 pairs of side-veins like *I. javanica*. They might be classed with either species.

Form 2

As Form 1 but the petals narrower, .35 cm. wide, pointed and turning deep red.

Malayan Collections

Perlis; Henderson 22950.
Penang; Curtis s.n. (cult. Bot. Gdns.).
Kelantan; Corner 33434.
(? Selangor; For. Dept. 17493).

Siam

Kiah 24360 (det. *I. amoena* by Craib).

Java

Hallier 142.

Form 4

Corolla-tube 3–3·8 cm. long, the limb 2·2–2·5 cm. wide: petals ·6 cm. wide, acute or subacute.

Malayan Collections

Singapore; (cult. in Hort. Bot.) Corner.

Form 5

Corolla-tube 3–3·8 cm. long, limb 1·5–2 cm. wide: petals ·5–·6 cm. wide, turning reddish pink.

Malayan Collections

Kelantan; Corner 33437.

Form 6

As Form 5 but the petals narrower, ·3–·5 cm. wide.

Malayan Collections

Kedah; Ridley 8354.
(? Singapore, Ridley s.n. 9.11.1892, Kranji).

Form 7 Giant or Common Red Ixora

Corolla-tube 3–3·8 cm. wide, limb 1·5–2 cm. wide: petals ·5 cm. wide, pointed, turning intensely brick-red.

Leaves rather large, the blade 8–28 × 5–12·5 cm.

Malayan Collections

Kedah; Ridley s.n. June 1893.
Kelantan; Corner 33436, s.n. 21.4.37 (Kota Bahru), s.n. 22.4.37 (Kota Bahru).
Perak; Ridley 9710, Seimund s.n. 6.12.25 (P. Lalang), s.n. 8.3.26 (P. Rumbia) s.n. 23.3.26 (P. Rumbia).
Pahang; Burkill s.n. June 1915 (P. Tioman).
Malacca; Seimund s.n. 8.4.21 (P. Jarak).
Singapore; (cult. in Hort. Bot.) Cantley s.n., Nur s.n. 15.8.18, 14.6.29. Corner.

Anamba Islands

Henderson 20225.

This is the commonest garden Ixora in Malaya, yet one that offers the greatest difficulty in classification. It has generally larger leaves with more numerous veins than *I. javanica*, besides pointed petals, and it flowers continuously all the year, whereas the wild forms of *I. javanica* like those

of *I. congesta* and *I. Lobbii* are seasonal. In the Singapore Botanic Gardens it has for many years been called *I. macrothyrsa* but it does not answer in any detail with the description of that species in Bot. Mag. t. 6853. It seems that dried specimens have never come into the hands of systematists working on the flora of Malaya or of neighbouring countries, unless as Wallich 6152 as I have suggested under *I. fulgens*. It corresponds so remarkably well with Roxburgh's interpretations of *I. fulgens* that it seems to be the species which he intended though whether it is the true *I. fulgens*, taxonomically, has still to be discovered.

It is known, colloquially, as the Common Red Ixora or the Giant Ixora. The only other garden-variety with which it may be mistaken is *I. congesta* form 9, which differs in its larger, redder flowers that develop seasonally, its much less bushy habit and its more numerous side-veins in the leaf.

Form 8

As Form 7, but the petals pale orange-buff turning pale red.

Malayan Collections

Kelantan; Corner 33435.
Trengganu; Holttum s.n. 10.5.25 (K. Trengganu).
Singapore; (cult. in Hort. Bot.).

Form 9

As Form 7 but the corolla-limb 2–2·3 cm. wide.

Siam

Haniff & Nur 3910 (det. *I. amoena* by Craib).

Malaya

Pahang; Corner 29910.

Form 10

As Form 7 but the corolla-limb 1–1·5 cm. wide.

Malayan Collections

Kedah; Curtis 2607, Ridley 8354: (both det. *I. amoena* by Craib).
Penang; Ridley 7092.
Perak; Kunstler 2247.

Form 11

As Form 10, but the petals only ·2 cm. wide, narrowly oblong.

Malayan Collections

Province Wellesley; Ridley 10776.

Form 12

Corolla-tube 3·8–4·3 cm. long, limb 1·2–1·5 cm. wide; petals ·3 cm. wide, subacute, salmon-pink, never red.

Malayan Collections

Kelantan; Corner s.n. 22.4.37 (Kota Bahru).

Form 13

Corolla-tube 3·8–4·3 cm. long, limb 1·7–2·3 cm. wide; petals ·5–·6 cm. wide, pointed.

Malayan Collections

Trengganu; Moysey 33891.

Form 14

As Form 13 but the petals narrower, ·3–·4 cm. wide, blunt, turning deep brick red.

Malayan Collections

Kelantan; Corner s.n. April 1937 (2 collections).

Form 15

As Form 14 but the flowers pale reddish pink.

Malayan Collections

Kelantan; Corner s.n. 22.4.37 (Kota Bahru).

Form 16

Corolla-tube 3·8–4·3 cm. long, limb 2·3–2·5 cm. wide: petals ·6–·7 cm. wide, pointed, pale yellow then salmon pink.

Malayan Collections

Kelantan; Corner 33438, Nur & Foxworthy 12255.

Form 17 Yellow Javanica

Corolla-tube 2·5–3 cm. long, limb 1·5–1·9 cm. wide: petals blunt, persistently light orange buff or apricot-buff never reddening.

Malayan Collections

Singapore; (cultivated) Corner 34513, Hort. Bot. Sing. s.n. 10.8.21.

This and the following form are cultivated in Malayan gardens as a "Yellow Ixora" but they may be more accurately known as the "Yellow Javanica", to distinguish them from the "Yellow Coccinea". The colour is not a true yellow but a pale dull orange slightly pink.

Form 18 Yellow Javanica

As Form 17 but the corolla-limb wider, 2–2·5 cm. wide.

Malayan Collections

Singapore; (cult.).

Form 19 Pink Javanica

Corolla-tube 3·2–3·8 cm. long, limb 2–2·6 cm. wide: petals ·4–·6 cm. wide, pointed, elliptic, pale yellow buff turning wholly pale rose pink, never red.

Malayan Collections

Negri Sembilan; Corner 31502.

This collection is from a rather narrow-leafed shrub, 10 ft. high, growing in thickets by a sluggish, forest stream beside the main road from Tampin to Gemas. Plants with rather broader leaves are also cultivated in Malayan gardens as a "Pink Ixora": they may be known more accurately as the "Pink Javanica".

Form 20

Corolla-tube 2–2·8 cm. long, limb 1–1·5 cm. wide: petals ·3–·4 cm. wide, blunt. Leaves thin.

Malayan Collections

Trengganu; Rostado s.n. Feb. 1904 (K. Kemaman).

Form 21

As Form 20 but with subacute petals and very coriaceous leaves.

Malayan Collections

Singapore; (cult. in Hort. Bot.) Nur s.n. 22.6.29.

Form 22

As Form 20 but the corolla-limb wider, 1·8–2·3 cm.

Sumatra

Ridley 8979 (Penasa) (det. *I. Lobbii* ex. enum. Herb. Kew).

Form 23

Corolla-tube 2·7–3·3 cm. long, limb 1–1·3 cm. wide: petals ·2 cm. wide, subacute.

Malayan Collections

Perlis; Ridley 14997.
Penang; (cult. in Hort. Bot.) Curtis s.n. 29.11.02.

Siam

Setul; Ridley 14998 (det. *I. amoena* by Craib).

Form 24

Corolla-tube 2·8–3·5 cm. long, limb 1·3–1·8 cm. wide: petals ·3–·5 cm. wide, blunt to subacute.

Malayan Collections

Kelantan; Henderson 19572, 22595 (both det. *I. stenophylla*).
Trengganu; Corner 25924 (det. *I. stenophylla*).
Penang; (cult. in Hort. Bot.) Curtis s.n. Aug. 1900.
Perak; Corner s.n. 29.7.36 (Pangkor), Ridley 7187, 10276.
Pahang; Burkill and Haniff 17342, 17602, Burn Murdoch 158, 319, Cons. For. 4767, Evans 13231 (det. *I. concinna* ex enum. Herb. Kew), Henderson s.n. 19.8.29 (Kuantan), Ridley s.n. 19.8.89 (Pekan), s.n. 1891, s.n. 25.8.91 (Pasir Mandi, det. *I. concinna*), 1085 (det. *I. concinna*), Seimund 962, Walker 23326.
Selangor; Hume 7107, Ridley s.n. 1.1.21 (Klang Gates), 13408.
Malacca; Burkill 1327, Derry 84, Seimund 1139.
Johore; Corner 25960, 25961, Henderson 18218.
Singapore; (cult. in Hort. Bot.) s.n. 31.10.21, Nur s.n. 12.6.24, s.n. 9.9.24.

Anamba and Natuna Islands

Henderson 20450, v. Steenis 966.

Java

v. Steenis 5416.

Sumatra

v. Steenis 3847.

This is one of the common wild forms of *I. javanica* in Malaya. It is abundant by the sea-shore and, as a narrow-leafed bush of the flood-zone, by riversides.

Form 25

Corolla-tube 2·8–3·8 cm. long, limb 1·8–2 cm. wide: petals ·3–·5 cm. wide, elliptic, pointed.

Malayan Collections

Trengganu; Rostado 11971, s.n. 1904 (Bundi).
Pahang; Ridley 1075.
Singapore; (cult. in Hort. Bot.) Burkill s.n. 23.10.17, Corner s.n. 26.10.37.

Form 26

As Form 25 but the petals narrower and oblong, ·2–·3 cm. wide: corolla-tube 2·5–3 cm. long.

Malayan Collections

Singapore; (cult.) Corner s.n. 26.10.37.

Form 27

Corolla-tube 3·2–3·8 cm. long, limb 1·7–2 cm. wide: petals ·4–·6 cm. wide, *blunt*.

Malayan Collections

Kedah; Ridley 15890 (Pulau Rawei).
Johore; Holttum 24958 (Pulau Pelandok).

Form 28

Corolla-tube 3–3·8 cm. long, limb 2–2·5 cm. wide: petals ·4–·5 cm. wide, acute.

Malayan Collections

Pahang; Ridley 2114 (det. *I. concinna*).
Johore; Ridley 15403 (rather narrow-leafed, riverside shrub).

Form 29

Corolla-tube 3·8–5 cm. long, limb 1·7–2 cm. wide: petals ·3–·5 cm. wide, acute.

Malayan Collections

Kelantan; Nur and Foxworthy 12087.
Pahang; Burkill and Haniff 16107, Cons. For. 5176.

Java

Koorders 39079.

Sumatra

Robinson and Kloss s.n. 19.3.14 (Korinchi Exped.: det. *I. amœna*).

All these collections are from riverside shrubs with small, narrow leaves, up to 12 × 2·5 cm.

Form 30

As Form 29 but the corolla-limb wider, 2–2·5 cm.

Malayan Collections

Perak; Ridley 14312.
Pahang; Kiah and Strugnell 23981 (det. *I. stenophylla*).

Both collections are from narrow-leafed, riverside shrubs (blade 6–20 × 1·5–3 cm.).

Without open Flowers

Kedah; Dolman 21705.
Perak; Burkill 12435, Wray 3448.
Pahang; Burkill and Haniff 16936 (riverside bush with lanceolate leaves: det. *I. stenophylla*).

COLLECTIONS INTERMEDIATE BETWEEN *I. JAVANICA* AND *I. LOBBII*

Borneo

Elmer 20678, 21049, Wood 2262.

These three collections have been distributed as *I. Lobbii* but their leaves, which are narrowly oblong-elliptic (10–25 × 3·5–8·5 cm.), are simply pointed or subacute (not acuminate) and have only 10–16 pairs of side-veins. Therefore they are not *I. Lobbii*. I think they are extreme forms of *I. javanica* but the Ixoras of Borneo are too little known to be rightly understood.

COLLECTIONS INTERMEDIATE BETWEEN *I. CONGESTA* AND *I. JAVANICA*

Perak; Murton 43 (det. *I. congesta:* but more like *I. javanica* form 7 with leathery leaves).

Selangor; Hume 8433 (det. *I. congesta:* but more like *I. javanica* form 7 with leathery leaves and remarkably strong veins; "flowers pink" on the field note does not apply to *I. congesta*).

Malacca; Alvins 781 (det. *I. congesta:* but with 11–17 pairs of side-veins; exactly between *I. javanica multinervia* and *I. congesta*).

Singapore; Baker s.n. 17.7.17 (Gardens Jungle), Goodenough 5.2.89 (Selitar), Ridley 5067, 5674, s.n. 1892 (Chan Chu Kang), s.n. 1892 (Changi): (all these collections, having 10–16 pairs of side-veins, seem exactly between *I. congesta* and *I. javanica*).

I. Kingstonii Hook. fil.

Fl. Br. Ind. III, *1880,* p. 140.

A shrub or small tree up to 9 m. high, glabrous except for the puberulous branches of the inflorescence, or even wholly glabrous.

Leaf-blade 15–30 × 5–9 cm., rather narrowly oblong elliptic or narrowly obovate, more or less acuminate, the base cuneate, thinly coriaceous; *side-veins* 13–24 pairs, not distinctly inarching: petiole ·6–1·5 cm. long.

Corymb 5–12 cm. wide, *dense,* sessile or with a peduncle up to 3 cm. long, the branches articulate, 2–3 mm. wide, *rather short,* finely and often sparsely puberulous, or even glabrous: *bracts,* at the base of the main branches, 6–12 × 4–7 mm., broadly lanceolate, subacute, *rather leafy: bracteoles* 3–6 × 2·5–3·5 mm., oblong, acute or subacute like the sepals: *flowers yellow-red,* ? inodorous: *sepals* 2·5–5 × 1·5–2·5 mm., *longer than the ovary,* glabrous, *oblong, blunt or subacute, unequal in length in the same flower: corolla-tube* 3–3·5 cm. long, glabrous, the petals 6–7 × 3·5–5 mm. elliptic, blunt or subacute.

Distribution:—Malaya.

Type:—Griffith 2996 (Malacca).

Collections:—Perak; King's Collector 5972, Burn Murdoch 202, Wray 726, s.n. 1889 (Changkat Serdang).

Selangor; Curtis 2346, Ridley 5674, 7300, 8536, s.n. Aug. 1904 (Sempang Mines): For. Dept. 122, 4941, 8274, 24253.

Malacca; Goodenough 1271, Hervey s.n. 20.9.90, Ridley s.n. 1890 (S. Baru).

Johore; Curtis s.n. April 1901 (Muar).

Very little is known of this species which has seldom been collected within the last thirty years. I interpret the species from the specimens identified by King in the Singapore Herbarium. According to King, and to the field-note on Burn Murdoch's collection, the flowers are yellowish red, perhaps yellow turning red and this character distinguishes it radically from the similar species *I. multibracteata, I. merguensis* etc. with which it may easily be mistaken in the herbarium. It is most like *I. umbellata* but differs in the narrower, more coriaceous leaves, the broader bracts, stouter branches of the corymb as well as in the colour of the flower.

I. Lobbii King et Gamble — Glossy Ixora

Mat. Fl. Mal. Pen. 4, *1904*, p. 152.

Synonyms:—

I. Lobbii var. *angustifolia* K. & G., loc. cit. p. 153 *pro parte.*

I. fulgens Roxb. sensu Hook. fil., F.B.I. 3, p. 146 *pro parte* (*fide* King and Gamble).

I. aurorea var. *major* Ridley, Journ. Bot. 72, *1934*, p. 252.

An evergreen shrub or treelet, 1–10 m. high like *I. javanica.*

Leaf-blade 10–28 × 4–8·5 cm., *lanceolate-elliptic to lanceolate-obovate, more or less suddenly acuminate,* widest at or above the middle, the base gradually tapered, dark glossy green, with 12–26 pairs of lateral veins inclined forward and distinctly inarching near the margin.

Sepals subacute to acute.

Petals yellow or pinkish yellow turning red, *generally acute.*

Distribution:—Lower Siam, Malaya, Borneo, Sumatra, Anamba and Natuna Islands.

var. **stenophylla** var. nov. — Red River Ixora

Synonyms:—

I. stenophylla (Korth.) Kuntze sensu Ridley, Trans. Linn. Soc. 3, *1894*, p. 311, Fl. Mal. Pen. 2, *1923*, p. 94.

I. salicina Ridley, Journ. Bot. 72, *1934*, p. 253.

Lamina lanceolata, ·7–2·3 cm. lata, utrinque attenuata, apice longe acuminata, costis lateralibus utrinsecus 8–15; frutex riparius.

A riverside shrub ·5–3 m. high.

Leaf-blade 3·5–15 × ·7–2·3 cm., *lanceolate, gradually tapered to the long acuminate apex and to the base, broadest at the middle,* with 8–15 pairs of lateral veins distinctly inarching at the margin and making a wide angle with the midrib: petiole ·2–1·3 cm. long: stipular point up to ·9 cm. long.

Distribution:—Malaya, Borneo, Palawan (?).

Type:—Ridley 2215 (Tahan River, Pahang).

This species has hitherto been attributed to Loudon for authorship. On turning to Loudon's reference, (Encycl. Suppl.II, p. 1543) it will be seen, however, that there is no description. Loudon based his name on *Pavetta Lobbii* Teysm. et Binn., which is also a *nomen nudum* as well as a *nomen invalidum* from its manner of publication. Hence the authorship must be attributed to King and Gamble who first described it. These authors give a reference to "Pavetta Lobbii Teysm. et Binn. in Miq. Ann. Mus. Lugd. Bat. IV, 194", but I cannot find the name on this page, nor in the whole volume, nor in any other work of Miquel's. Misgivings arise, therefore, whether the name *I. Lobbii* has not been antedated because the species is one of the commonest in western Malaysia. This is, unfortunately, impossible to decide from the earlier descriptions of red Ixoras and so one must wait until herbaria have been ransacked for the types of the old species. Surely it did not escape Miquel.

The narrowly obovate, acuminate, many-veined, dark glossy green leaves and the acute petals will generally distinguish *I. Lobbii.* But there are narrow-leafed collections of *I. congesta* which seem to pass into *I. Lobbii* and likewise many-veined collections of *I. javanica*, particularly of *I. javanica retinervia* which has the acuminate blade, pointed petals, and inarching veins of *I. Lobbii.*

My basis for the identification of the Malayan material with *I. Lobbii* is the specimens so named by King in the Singapore Herbarium. King doubtless saw the specimen of Teysmann and Binnendijk in the Kew Herbarium. It seems that the species is not recognised outside Malaya, though Bremekamp reports it from the neighbouring islands of the Rhio Archipelago.

The variety *angustifolia* King and Gamble, as pointed out by Ridley, is a mixture of a narrow, lanceolate-leafed state of *I. Lobbii* and a small lanceolate-leafed riverside shrub. Of the collections cited by King and Gamble there belong to the first state Wray 519, Scortechini 1893 and King's collector 2718, and to the second only Ridley 2215. Therefore Ridley referred the first state to var. *angustifolia*, defined it anew and made Wray 519 as the lectotype: the second state he referred to the Bornean *Pavetta stenophylla* Korth. as *I. stenophylla* Ridley which name he changed subsequently to *I. salicina* as he considered the Bornean plant to be different. As regards var. *angustifolia* sensu Ridley, I am unable to distinguish it because there is every gradation to the typical, slightly broader-leafed state of *I. Lobbii*, and the variety has no particular habitat or distribution, specimens from all parts of Malaya being referable to it. Hence I merge this variety with *I. Lobbii.* On the other hand, *I. stenophylla* sensu Ridley (= *I. salicina*) is a well-marked riverside shrub with narrow, shorter leaves and fewer veins than typical *I. Lobbii* and in Malaya, it appears to be limited to the rocky streams that are the tributaries of the rivers flowing into the China Sea: in which relation, may be, it occurs also in Sarawak and probably, Palawan. Nevertheless, I am unable to follow Ridley in maintaining his *I. stenophylla* (*I. salicina*) as a species. The low shrubs by the banks of swift flowing rivers that are prone to frequent and sudden flooding, like the Tahan and its tributaries, have small narrow leaves very different at first glance from those of *I. Lobbii* in the quiet, deep shade of the forest, but the smaller and more precipitous the river the less are its riparian growths subject to flooding and the larger are the leaves and the bushes so that it is not easy to decide whether they should be classed as "stenophylla" or "Lobbii", *e.g.* the Johore

collection of var. *stenophylla* (shrubs 2–4 m. high). I prefer, therefore, to reduce *I. stenophylla* sensu Ridley as a variety of *I. Lobbii* without any decision about its identity with *Pavetta stenophylla* Korth. The narrow-leafed, riparian form of *Melastoma malabathricum* affords a comparable case.

The variety *stenophylla* has been confused in Malaya with the narrow leafed riparian states of *I. javanica* but these differ in having fewer lateral veins, which do not inarch distinctly but are directed obliquely forward, and, generally, in having less acuminate leaves and smaller flowers with blunt or subacute petals. The type of *I. aurorea* var. *major* Ridley, namely Nur 20007, is a riverside-form intermediate between *I. Lobbii* and var. *stenophylla*, perhaps a riverside-form of my form 7.

I. salicifolia (Bl.) (= *I. fulgens* Roxb. var. *salicifolia* K. & V.) differs from *I. Lobbii* var. *stenophylla* in having much longer, linear-oblong leaf-blades (12–38 × 1·2–2·5 cm.) with many more pairs of lateral veins (15–30 prs.). Nothing approaching *I. salicifolia* has been found in Malaya: and *I. Lobbii* seems not to occur in Java.

I. javanica var. *retinervia* may well be mistaken for *I. Lobbii* var. *stenophylla* in the herbarium. The var. *retinervia* is a small tree, or shrub, of lowland forest, not a riverside bush: its leaves are broader than those of var. *stenophylla*, have on the whole fewer lateral veins and are oblong elliptic to elliptic. It seems, moreover, that the Malayan specimens of var. *retinervia* are always distinguishable by their smaller flowers. Nevertheless, I feel there is some close relation between the two.

KEY TO THE FORMS OF *I. LOBBII*

Corolla-tube 2–2·7 cm. long
  Limb 1–1·3 cm. wide: petals ·25 cm. wide, acute .. Form 1
Corolla-tube 2·5–3·8 cm. long
  Limb 1·2–1·8 cm. wide: petals ·2–·4 cm. wide
    Petals acute .. .. Form 2
    Petals blunt .. .. Form 3
  Limb 2–2·5 cm. wide: petals ·4–·6 cm. wide, acute .. Form 4
  Limb 2·7–3·3 cm. wide: petals ·5–·8 cm. wide, acute .. Form 5
Corolla-tube 3·8–5 cm. long
  Petals ·4–·5 cm. wide, acute
    Limb 1·2–1·7 cm. wide: tube 3·7–5 cm. long .. Form 9
    Limb 1·8–2·3 cm. wide: tube 3·7–4·3 cm. long .. Form 6
  Petals ·5–·8 cm. wide: tube 3·7–5 cm. long
    Limb 1·8–2·5 cm. wide: petals ·5–·6 cm. wide .. Form 7
    Limb 2·5–3·3 cm. wide: petals ·7–·8 cm. wide .. Form 8

KEY TO THE FORMS OF *I. LOBBII* VAR. *STENOPHYLLA*

Corolla-tube 3–3·7 cm. long: petals ·4–·6 cm. wide
  Limb 1·7–2 cm. wide .. .. .. Form 10
  Limb 2·2–3 cm. wide .. .. .. Form 11

Corolla-tube 3·7–5 cm. long
Limb 2–2·8 cm. wide: petals ·4–·6 cm. wide .. Form 12
Limb 2·8–3·5 cm. wide: petals ·5–·7 cm. wide .. Form 13

Form 1

Corolla-tube 2–2·7 cm. long, limb 1–1·3 cm. wide; petals ·25 cm. wide, acute.

Form 2

Corolla-tube 3·2–3·8 cm. long, limb 1·25–1·8 cm. wide: petals ·25–·4 cm. wide, oblong, acute.

Malayan Collections

Kedah; Henderson 21264.
Penang; Burkill 813, 2599, Curtis s.n. March 1892 (Govt. Hill), s.n. April 1884, 479.
Province Wellesley; Ridley 6991.
Perak; Cantley s.n., Curtis 3338, Fox 158, For. Dept. 11567, Ridley s.n. 1892 (K. Kangsar), s.n. 1892 (Maxwell's Hill), Scortechini s.n.
Pahang; Henderson 10695, Kiah 23901.
Selangor; Burkill 7580, Cons. For. 2278, Hume 9254, Pestana 28430.
Malacca; Alwins s.n., Alwins 60, Burkill 462, 1321, Corner s.n. 23.2.36, Derry 10, Hullett s.n. April 1888 (Mt. Ophir).
Singapore; Cantley s.n., Corner s.n. 1.4.37, Nur s.n. 23.2.29, Ridley 5673.

Anamba Islands

Henderson 20124.

This is the commonest form of *I. Lobbii*, but whether it is taxonomically the typical state I do not know.

Form 3

as Form 2 but the petals blunt to subacute.

Siam

Curtis 3258 (Kasoom).

Borneo

Moulton 6703/15 (Upper Baram, Sarawak: det. *I. cf. amoena*).

Form 4

Corolla-tube 3–3·8 cm. long, the limb 2–2·5 cm. wide: petals ·4–·6 cm. wide, lanceolate, acute.

Malayan Collections

Pahang; Henderson 21655 (Pulau Tioman).

Anamba Islands

Henderson 20185 (det. *I. javanica*).

Form 5

Corolla-tube 3–3·8 cm. long, the limb 2·7–3·3 cm. wide: petals ·5–·8 cm. wide, acute.

Sumatra

Ridley 8970 (Batang Mandan, det. *I. fulgens*).

Except for its short corolla-tube, this form agrees with Form 8. Ridley's collection has, however, much smaller leaves than is general in the collections of Form 8.

Form 6

Corolla-tube 3·8–4·3 cm. long, the limb 1·8–2·3 cm. wide; petals ·4–·5 cm. wide, elliptic, acute.

Malayan Collections

Pahang; Burkill and Holttum 8607, Henderson 10584, Nur 11179.

Sumatra

Posthumus 724 (Djambi; det. *I. javanica*).

Form 7 Ixora Sedili

Corolla-tube 3·8–5 cm. long, limb 1·8–2·5 cm. wide; petals ·5–·6 cm. wide, elliptic, acute: (corymb branches pale green in 32293).

Malayan Collections

Johore; Corner 28166, 30787, 30962, 32293, 32495, Fielding s.n. Oct. 1892 (Pulau Tinggi).

This fine Ixora is known only from the watershed of the Sedili River in the East of Johore and from the island, P. Tinggi, off the East Coast of Johore. One may expect it therefore in Borneo, where its nearest ally, Form 8, occurs. It commonly develops into a spindly tree, 15–25 ft. high, with chocolate brown, cracked bark; the leaves have rather large, thinly leathery, dark glossy green blades which in shape and venation are inclined to resemble those of *I. congesta*, though they are always acuminate and generally more or less obovate and narrower. The more numerous veins and pointed petals distinguish it from *I. congesta* Form 10: it seems also to have a different distribution but our knowledge of the flora on the East side of Malaya is yet very meagre.

Form 8 Giant Glossy Ixora

As Form 7 but the corolla-limb 2·5–3·3 cm. wide, the petals ·65–·8 cm. wide: (corymb branches pale green in 32292).

Malaya

Johore; Corner 32292.

Borneo

Allen 629 (Payao R., B.N.B., det. *I. congesta*).
Moulton 78 (Baram R., Sarawak, det. *I. fulgens*).

This is the finest red-flowered Ixora that I have seen. The big shining flowers contrast splendidly with the dark glossy leaves.

Form 9

Corolla-tube 3·5–5 cm. long, limb 1·2–1·7 cm. wide, petals ·4–·5 cm. wide.

Malayan Collections

Perak; Anderson 152, Burkill and Haniff 12713, Haniff 21043, Ridley 152, Wray s.n. 1889 (Taiping).

This variety from the Perak Hills has lanceolate leaves 12–24 × 2–5 cm. It much resembles var. *stenophylla* but the longer leaf-blade and a habit that is not riparian distinguish it.

STERILE, FRUITING OR NOT FLOWERING COLLECTIONS

Malaya

Penang; Curtis s.n.
Province Wellesley; Burkill 6538, Ridley s.n. Dec. 1895.
Perak; Haniff 10555, Ridley s.n. March 1896 (Gunong Tunggul), Wray 519, 952, 2891, 3449.
Pahang; Burkill & Haniff 17003, For. Dept. 28273, Machado 11569.

Selangor; Ridley s.n. June 1889 (K. Lumpur).
Negri Sembilan; Nur 797.
Malacca; Alwins s.n., Burkill 6419, Derry 966.
Johore; Corner s.n. 11.3.37, Ridley 11324, s.n. March 1908 (S. Tebrau), s.n. Aug. 1908 (Sedenah).
Singapore; Cantley 83, Hullett s.n. 1893 (Changi Road).

Sumatra

Bartlett and La Rue 29 (det. *I. salicifolia*).
Bunnemeyer 3204 (det. *I. salicifolia*).

Anamba Islands

v. Steenis 897 (det. *I. javanica*).

Borneo

For. Dept. B.N.B. 4705.

FORMS OF VAR. *STENOPHYLLA*

Form 10

Corolla-tube 3–3·7 cm. long, limb 1·7–2 cm. wide: petals ·4–·6 cm. wide.

Malayan Collections

Johore; Holttum 10870.

Form 11

As Form 9 but the corolla-tube 2·2–3 cm. wide.

Malayan Collections

Trengganu; Corner 25825, s.n. 24.6.32 (Kemaman).

Borneo

Ridley 12443 (Puak) (det. *I. stenophylla*).

Philippine Islands

Merrill 1362 (Palawan: det. *I. fulgens*).

Form 12

As Form 11 but corolla-tube 2–2·8 cm. wide, petals ·4–·6 cm. wide.

Malayan Collections

Kelantan; Haniff & Nur 10280.
Pahang; Burkill and Haniff 16562, Corner s.n. Sept. 1937 (S. Tahan) (2 collections), Haniff and Nur 8089, Ridley 2215, Seimund 496, 585, Strugnell 22463.

Form 13

As Form 11, but corolla-limb 2·8–3·5 cm. wide, petals ·5–·7 cm. wide.

Malayan Collections

Johore; Corner 32490.
Pahang; Corner s.n. 7.9.37 (S. Tahan).

STERILE, FRUITING OR WITHOUT FLOWERS

Malayan Collections

Perak; Ridley s.n. Sept. 1890 (Bujong Malacca).
Pahang; Seimund 586, Nur 18924 (det. *I. stricta*).
Johore; Ridley s.n. 1904 (Castlewood).

Borneo

Anderson 213 (Gunong Rumput), Ridley 11743 (Bidi).

COLLECTIONS BETWEEN *I. LOBBII* AND VAR. *STENOPHYLLA*

Johore; Nur 20007 (type of *I. aurorea* var. *major* Ridley): Corner 31434.

These collections may well be narrow leafed riverside plants of my form 7. Their leaves are not lanceolate enough for true var. *stenophylla.*

I. micrantha Ridley — Mountain Ixora

Journ. St. Br. R. As. Soc. 61, *1912,* p. 21.

Synonym:—

I. patens Ridley Journ. St. Br. R. As. Soc. 79, *1918,* p. 83.

A mountain shrub or small tree to 8 m. high: glabrous except for the puberulous branches of the corymb.

Leaf-blade 9–18 × 3–8 cm., *oblong elliptic* or slightly obovate, *more or less acuminate,* the base cuneate or rather abruptly rounded, scarcely coriaceous, with 9–16 pairs of side-veins directed obliquely forward and inarching near the edge: petiole ·3–1·5 cm. long: stipular point 3–7 mm. long.

Corymb 6–20 cm. wide, 5–14 cm. high, *large, sessile or very shortly stalked, the branches* articulate and *puberulous,* the *flowers* densely crowded and more or less sessile, *very fragrant:* sepals as long as or shorter than the ovary, subacute: *corolla-tube* 3–9 mm. long, *pink or red, or yellow turning red; petals* 2·5–3 × 1·5 mm., *oblong,* blunt or subacute, *reflexed along the tube, yellow gradually turning red.*

Berry 1 cm. wide, subglobose, scarcely sulcate.

Distribution:—Malaya; apparently only in the mountains, 1000–1700 m.

Typus:—Ridley 15830, Sempang Mines, Selangor, April 1911.

KEY TO THE FORMS

Corolla-tube 3–5 mm. long	Form 1
Corolla-tube 7–9 mm. long	Form 2

Collections

Form 1:—Haniff 2455 (Perak, G. Hijau), For. Dept. 27552 (Pahang), Anderson 31 *pro parte* (Perak, G. Hijau).

Form 2:—Anderson 31 *pro parte,* Burkill and Haniff 12629, Henderson 11819 (all three from G. Hijau, Perak), Wray 3934 (Perak, G. Bubu), Hose 78 (Selangor, Fraser's Hill), Ridley 15830 (Selangor), Robinson s.n. 19.1.93 (Selangor, G. Menkuang: *type* of *I. patens*).

Without full-grown flowers:—Ridley 9708 (Perak, G. Keledang), 13640 (Pahang, Telom Valley) For. Dept. 28117 (Pahang, S. Lemai), 23394 (Selangor, Fraser's Hill).

This species is closely allied with *I. concinna,* having the same small fragrant flower with yellow corolla turning red, and similar leaves, but it is easily distinguished by its much larger inflorescences with stouter, puberulous branches. Most of the Malayan specimens have been identified with *I. concinna.* Ridley remarked that the species was related to *I. grandifolia* but the bracteate, articulate ramuli of the corymb forbid such an alliance.

I can find no specific difference whatever between the types of *I. micrantha* and *I. patens*. Ridley's statement that *I. micrantha* has only 9 pairs of side-veins to the leaf is wrong: the type-specimen has as many as 13. The differences in size of leaf and corymb, given by Ridley, are trivial and such as occur in any plant.

The collection Wray 3934 is the basis of the record of *I. undulata* in Malaya, being determined as such by King and Ridley. Wray's fieldnote is "flower yellow, tube tinged pink, as the flower gets older it turns to red", but *I. undulata* has white flowers, and this is to me conclusive that Wray's plant is not *I. undulata:* indeed, Wray's plant is identical with the type of *I. micrantha.*

I. nigricans W. et A. White Needles

Prodr. Fl. Ind. I, *1834*, p. 428.
Wight Ic. Pl. t. 318.

Synonyms:—

I. affinis Don, Gen. Syst. 3, *1834*, p. 571.
I. erubescens Don, loc. cit.
I. arguta King, Mat. Fl. Mal. Pen. 4, *1904*, p. 148.
I. plumea Ridley, Journ. Str. Br. R. As. Soc. 59, *1911*, p. 117.
I. nigricans var. *erubescens* Kurz, For. Fl. Burma 2, *1877*, p. 24.
I. nigricans var. *arguta* Hook. f., F.B.I. 3, *1880*, p. 149.
I. affinis var. *arguta* Craib, Fl. Siam. En. 2, *1934*, p. 147.
I. affinis var. *plumea* Craib, loc. cit. p. 148.
Pavetta acutiflora Korth. Ned. Kruidk. 2. *1851*, p. 262 (fide auctt.).
Pavetta subulata Teysm. and Binn. Ned. Kruidk. Arch. 3, *1855*, p. 403 (fide auctt.).

A bush or treelet to 4 m. high, flowering at 1 m., glabrous except for the puberulous branches of the corymb.

Leaf-blade 8–20 × 2·5–8 cm., narrowly elliptic to elliptic obovate, acuminate, *gradually tapered to the base*, the upper leaves on flowering branches often shorter, broader, and ovate or even cordate, *membranous, blackening in drying: side-veins* 7–12 pairs, not or vaguely inarching: *petiole* ·5–1·5 cm. long: stipule-point ·3–·8 cm. long.

Corymb 5–15 cm. wide, rather lax, erect, sessile or with a peduncle up to 4 cm. long, the branches slender, articulate, more or less puberulous, often reddish: *bracts* 4–8 × ·1 mm. *linear-lanceolate: bracteoles* like the sepals but slightly broader: *flowers white, fragrant* often only faintly: sepals ·7–1·5 mm. long, *linear-lanceolate, glabrous,* as long as, longer than or shorter than the ovary (ca. 1 mm. long), green: *corolla-tube* ·8–1·3 cm. long, glabrous, the mouth also glabrous, white: *petals* 4–6·5 × 1–1·5 mm. linear-oblong, acute or becoming blunt on expansion, recurved against the tube; style projecting 3–6 mm.: ovary green or purplish.

Distribution:—India, Indo-China, Siam, Malaya, Sumatra, Anamba and Natuna Islands, Java, Bali.

Type:—Wight 1335.

Collections:—

Siam; Haniff and Nur 3590, 3851, Keith 277, Ridley 15098.
Perlis; Ridley 14995, 15097, Henderson 23007.

Kedah; Best 21213, Curtis 3206, Holttum 15083, Ridley 8299.
Kelantan; Corner s.n. 1.5.37 (Kota Bahru).
Trengganu; Corner s.n. 1.5.37 (S. Besut).
Penang; Curtis 986, For. Guard. s.n. Ayer Itam, s.n. Balek Pulau.
Province Wellesley; Ridley 7013.
Perak; Curtis 1303, Haniff 14184, Henderson 10074, 10295, King's Collector 870, 10901, Ridley 7188, 11905, s.n. 1891, s.n. 1898, Wray 2135.
Pahang; Burkill s.n. June 1915 (P. Tioman), Evans 13229, Henderson 10665, 21678, Nur 18552.
Selangor; Ridley 8240, s.n. 1897.
Negri Sembilan; Burkill 4962.
Malacca; Alvins 1034.
Johore; Fielding s.n. 1892 (P. Dayong), Henderson 18212.

var. **ovalis** Pitard

Fl. Gen. Indoch. 3, *1924*, p. 322.
Synonyms:—
I. lucida Hook. f., F.B.I. 3, *1880*, p. 148.
I. lucida var. *densipila* Craib, Fl. Siam Enum. 2, *1934*, p. 161.
Leaf-blade 5–14 × 2–6 cm., *broadly elliptic to ovate-elliptic, generally broadly rounded at the base, the apex distinctly acuminate, drying shiny*, the side-veins arising at a wider angle from the midrib and distinctly inarching near the margin: petiole rather short, 2–7 mm. long.
Corolla-tube 2–3 cm. long, puberulous, the mouth glabrous or more or less bearded: petals 5–7 × 2 mm.: ovary and sepals puberulous.
Distribution:—Indo-China, Siam, Malaya (north).
Type:—Pierre's specimen from Tan-Huyen (prov. Bienhoa).
Collections:—
Siam; Kerr 7108.
Penang; Curtis 2451, Nur 1478.
Kelantan; Henderson s.n. 22.10.28 (Gua Ninek), s.n. 15.7.35 (Gua Teja).
Perak; Henderson 23856, Ridley s.n. Aug. 1909 (K. Kenering).

King's reason for rejecting the name *I. nigricans* for the Malayan specimens in favour of *I. arguta* rested on a misunderstanding. King regarded the Wallichian collection 6154 as the type of *I. nigricans* and, having discovered that the number included a variety of plants, he rejected *I. nigricans* as a confused species. But the publication of *I. nigricans* dates from Wight and Arnott's Prodromus where, in the paragraph following the description, it was clearly stated that the description was based on the collection 1335 of Wight's with the remark that this collection was not included under the Wallichian aggregate 6154. Wight's illustration is taken from his own collection and it undoubtedly depicts the Malayan species. Wight and Arnott described the corolla-tube as three-quarters of an inch long but the illustration shows the corolla-tube 10–12

mm. long as in most Malayan specimens and as described by Koorders and Valeton, King and Pitard. Hence I have no doubt of the identify of our Malayan plants.

Don's species, *I. affinis* and *I. erubescens*, have generally been regarded as identical with *I. nigricans*. They were published in the same year without any indication of priority over *I. nigricans* and, as this name is the better known, Don's have been reduced to synonyms (Bremekamp, Journ. Bot. 75, *1935* p. 296). Craib considered that Don's species were different from *I. nigricans* but gave no reason.

I. plumea Ridley is identical with *I. nigricans*. Craib endeavoured to distinguish it as a variety of *I. affinis* on the character of the sepals being longer than the ovary. But I find that there is every gradation to states with the sepals as long as the ovary and those with the sepals shorter: and the differences are trivial, concerning a length of ·5–·75 mm. Craib also distinguished *I. arguta* King as a variety of *I. affinis* without saying how it differed. The distinction between *I. affinis* and *I. erubescens* lies in the more oblong leaf and shorter petiole of *I. erubescens* according to Craib but he does not give the length of the petiole in either or say from what part of the plant the leaf or the petiole is to be taken for comparison. I consider that none of these distinctions has even varietal value especially when the general variableness of the plants in the length of the corolla-tube and petals, the size of the leaf and corymb, and the colour of the ovary has been disregarded.

On the other hand, var. *ovalis* Pitard does seem worth varietal rank through the longer corolla-tube, the different venation and the rounded leaf-base. Its leaves, in fact, throughout the plant are like those just below the corymbs of typical *I. nigricans*. Nevertheless there are some collections intermediate between the two, and the variety has all the important specific characters of *I. nigricans* though Bremekamp excludes it. Craib's *I. lucida* var. *densipila* seems to be only an extreme form of var. *ovalis* with densely puberulous corolla-tube and heavily bearded corolla-mouth. The collection, Curtis 2451, has a rather thinly bearded corolla-mouth whereas all the other Malayan collections have a glabrous mouth.

Of the typical *I. nigricans* the flowering specimens in the Singapore Herbarium can be separated into two forms, those with the corolla-tube 8–9 mm. long and those with the tube 10–13 mm. long. However, the length of the petals does not always vary concurrently there being short-tubed collection with long petals (5·5–6·5 mm.) and long-tubed collections with short petals (4–5 mm. long) as well as *vice versa*.

I. pendula Jack — Pink Needles

Mal. Misc. 1, *1820*, p. 11.

Synonyms:—

I. opaca Don, Gen. Syst. 3, *1834*, p. 573.

I. montana Ridley, Journ. Str. Br. Roy. As. Soc. 79, *1918*, p. 82.

I. candida Ridley, Journ. F.M.S. Mus. 10, *1920*, p. 141.

I. pendula var. *opaca* Ridley, Fl. Mal. Pen. II, *1923*, p. 96.

I. Parkinsoniana Craib, Kew Bull. *1932*, p. 428.

A shrub or small tree up to 8 m. high, glabrous except for the puberulous cyme-branches and corolla-tube, occasionally wholly glabrous or with the corolla-tube glabrous.

Leaf-blade 10–35 × 3–12·5 cm., elliptic, oblong-elliptic, lanceolate elliptic or more or less obovate, the apex subacute, acute or distinctly acuminate, the base gradually tapered or rather suddenly rounded, thinly leathery or distinctly so, dull dark green: *side-veins* 12–24 pairs, directed forward and distinctly inarching near the edge: *petiole* ·6–1·8 cm. long, rather stout: stipular point ·2–1 cm. long.

Corymb 3–23 cm. wide, *deflexed perpendicularly on a long peduncle*, 1–28 cm. long, *the peduncle and branches* generally puberulous and more or less *suffused purple, articulate*, the corymb terminal or from the twigs behind the leaves and *generally with a pair of leaf-like, often sessile and cordate, bracts at the base; the flowers not scented: sepals* varying lanceolate, acute and as long as the ovary (1 mm. long) to bluntly triangular and shorter than the ovary, the ovary and sepals glabrous or more or less puberulous: *corolla-tube* 1·8–3·5 cm. long, *deep rose-red*, generally puberulous outside, but often glabrous or nearly so, the limb ·9–1·6 cm. wide: *petals* 1·5–2·5 mm. wide, oblong, subacute, more or less reflexed along the tube, with reflexed edges, *white, or tipped pink, or partly suffused pink.*

Distribution:—Siam, Malaya, Sumatra.

Type:—Non extant, the type-locality being Penang.

Form 1

(= *I. diversifolia* Kurz sensu King and Ridley).

Corolla-tube 1–1·2 cm. long, the limb ·8–·9 cm. wide.

Collections:—

Lower Siam; Haniff and Nur 2718, Kiah 24363.

Malaya; King's Collector 5737, Ridley s.n. July 1909 (Ulu Temango), Wray 3491.

I can distinguish only one species in Malaya which has deflexed, scentless inflorescences, deep pink corolla-tubes and white petals, and such must therefore be *I. pendula* Jack. It is nevertheless exceedingly variable in detail, especially in the leaf. The variable features are the leaf-size, shape, venation and texture, the size of the corymb and the length of the peduncle, the length of the corolla-tube and the hairiness of the cyme-branches and corolla-tube. If one attempted to distinguish varieties or forms reckoning with all these characters, the number would be impractical.

Some of the Penang specimens in the Singapore Herbarium have large, rather blunt, not acuminate, leaves with rather few veins (blade 18–35 × 6–12.5 cm., veins

12–16 pairs): these are Burkill 6898, Curtis 2240, Curtis s.n. July 1887, April 1890, February 1900. On the sheet of Curtis s.n. July 1887 King has written "exactly the same as the type Wallich Cat. 6127": this collection is not the type but may be regarded as the neotopotype. Other collections have linear leaves 10–20 × 2–4 cm. There is, however, such diversity of the leaves in detail, with every intermediate condition, that I do not see how varieties can be maintained on such characters: I have noticed, too, that the leaves on the short flowering twigs are often smaller, more pointed and with rounded bases than those of the stout vegetative shoots.

The size of the inflorescence and the length of the peduncle vary extraordinarily. King distinguished *I. opaca* from *I. pendula* by its short peduncle, 1–5 cm. long, and its erect corymb. The first point indicates merely the lowest part of the range in size of the inflorescence and is connected by all intermediates with the largest. The second point is certainly an error by no means easy to detect from herbarium specimens: the collections Ridley 3071, King's Collector 4061 and 4118, identified by King as *I. opaca* have the typical deflexed inflorescences. Ridley's definition of *I. pendula* var. *opaca* is not applicable, and there is no evidence that it is a mountain form more than a lowland. Hence I reduce *I. opaca* to *I. pendula*, as being founded on an inadequate range of material. The type of *I. opaca* is Wallich 6141 from Penang.

As regards the size of the corolla some collections have the tube 2·2 cm. long with the limb 1·2 cm. wide, others have the tube 3·5 cm. long and the limb 1·6 cm. wide, but most collections have some intermediate size. A few collections have the tube only 1–1·2 cm. long and the limb 8–9 mm. wide and they have been identified with *I. diversifolia* Kurz by King and Ridley. Some of these have unusually large leaves (up to 35 × 18 cm.) but I cannot see any specific difference between them and *I. pendula*, for they have the same characteristic inflorescence and flowers and they display the same diversity of leaf. Whether they are true *I. diversifolia* which comes from Burma and has 'white' flowers I do not know. Hence I am content to regard them as a form only, like the forms of other Ixoras variable in size of corolla.

Of *I. montana* Ridley, there is a part of the fragmentary type-collection (Haniff 16310) at Singapore, consisting of two twigs, an inflorescence and two leaf-bases. It is identical with *I. pendula* except for the rather shorter corolla-tube (1·8–2 cm. long) and thus it connects with my form 1. The inflorescence is on a short peduncle like that of *I. opaca* but it is a wide inflorescence typical of *I. pendula*.

Whether the inflorescence was decurved, or the twig bearing the inflorescence was decurved, is now impossible to discover but, as the specimen agrees in all other points with other mountain specimens of *I. pendula*, I have not the slightest hesitation in reducing it.

I. candida Ridley is merely a narrow-leafed form of *I. pendula* var. *opaca;* that is, of the state of *I. pendula* with a small, shortly pedunculate inflorescence. Specimens of both type-collections are at Singapore: (it seems that the number 6219, given by Ridley, for Robinson's collection at Dayang Bunting should be 6189 as numbered in the Singapore Herbarium). There are numerous intermediates connecting these lanceolate-leafed specimens (with blades only 6–12 × 1·5–3 cm.) to the typical *I. pendula*. Both type-collections show the deflexed inflorescence and both have a puberulous ovary as in Craib's *I. Parkinsoniana*. The reason for considering the flowers as white is the field-note "flowers white" to Robinson's unnumbered syntype from Telok Wau, Terutan: it is likely that the pink-corolla-tube was concealed by the expanded white petals and so escaped the notice of the collector.

I. Parkinsoniana, according to the collections named by Craib in the Singapore Herbarium, is merely a form of *I. pendula* with puberulous ovary and sepals, short-corolla-tube (1·5 cm. long) and rather small, though long-pedunculate, corymb. These collections show that the inflorescence was deflexed as in *I. pendula*. Craib does not explain how *I. Parkinsoniana* is to be distinguished from *I. pendula*. If *I. Parkinsoniana* can be split off on the evidence of a puberulous calyx and corolla-tube, what should one do with the other forms of *I. pendula* with puberulous corymb and corolla-tube, puberulous corymb and glabrous corolla-tube, glabrous corymb and puberulous corolla-tube, and those glabrous in all parts? Then add to these variations, all the varieties of leaf-size, texture and venation, of width of corymb and of length of peduncle. To separate such as "species" seems to me not only impracticable in the extreme but also inability to distinguish "the wood for the trees", losing thereby the major aspects of natural features. The specimens named *I. Parkinsoniana* by Craib in the Singapore Herbarium are:—Holttum 15126, Haniff and Nur 3557, Ridley s.n. Jan. 1897 (Langkawi), Haniff 15531 (all from the island of Lankawi).

I. pumila Ridley

F.M.S. Mus. Journ. 10, *1920*, p. 142.

A dwarf shrub, 30 cm. high, with finely villous stem, petioles and branches of the inflorescence, and thinly villous undersides to the leaves.

Leaf-blade 12–18 × 5–7½ cm., obovate elliptic, simply pointed, gradually attenuate to the base, thin: *side-veins* 10–14 pairs directed obliquely forward, not inarching, the tertiary veins rather close and transverse: *petiole* 3–8 mm. long: stipule lanceolate with a long point, 4–6 mm. long.

Corymb 5 cm. wide, on a peduncle 4 cm. long, the branches articulate, hairy, erect, *the corolla white:* bracts lanceolate, the lowest pair 10 × 15 mm., the bracteoles like the sepals: *sepals* ·2–·3 cm. long, *lanceolate or linear-lanceolate,* acute, *hairy,* longer than the ovary: *corolla-tube* 3 cm. long, *glabrous:* the *petals* 5 × 2 mm., oblong, subacute: corolla-mouth glabrous.

Distribution:—Malaya.

Type:—Evans 13226 (Gunong Senyum, Pahang, June 1917).

This species, known only from the type-collection, should be easily recognised from the hairy stems and undersides of the leaves, the hairy lanceolate sepals and glabrous white corolla as well as from its apparently dwarf habit.

Compare *I. clerodendron* with broad red sepals and *I. Brunonis* with differently shaped leaves, hairy corolla-tube, and longer sepals.

I. Robinsonii Ridley — Tahan Ixora

Journ. F.M.S. Mus. VI, *1915,* p. 154.

A shrub up to 2 m. tall: glabrous.

Leaf-blade 7·5–20·5 × 2–7·6 cm., *rather narrowly elliptic to broadly lanceolate* or lanceolate-obovate, *the apex tapered,* simply acute or acuminate, *the base very gradually tapered into the petiole, leathery, the edge incurved: lateral veins* 9–18 pairs, passing obliquely out at a wide angle from the midrib, inarching near the edge, the reticulations coarse: *petiole* ·5–2 cm. long, *rather flattened and woody,* passing so gradually into the blade as to have its upper limit indiscernible: stipular point 1–5 mm. long.

Corymb 7·5–15 cm. wide, the peduncle 0–2·5 cm. long, *the branches red:* sepals acute or subacute: corolla-tube 3·8–5 cm. long, the limb 2·3–3·8 cm. wide, the 4 petals ·5–·9 cm. wide, elliptic, acute, *deep salmon pink to scarlet.*

Distribution:—Malaya (Gunong Tahan, G. Padang and ? neighbouring mountains, 600–1800 m.).

Type:—Robinson 5304 (Gunong Tahan, 1300 m. alt.).

Key to the Forms

Corolla-tube 3·8–4·5 cm. long: limb 2·3–2·8 cm. wide: petals ·5 cm. wide .. .. .. Form 1

Corolla-tube 4·3–5 cm. long: limb 3–3·8 cm. wide: petals ·6–·9 cm. wide .. .. Form 2

Collections

Form 1

Pahang; Robinson & Wray 5304 *pro parte* (G. Tahan).

Form 2

Kelantan; Henderson 19736 (ca. 650 m. Gua Ninek).

Pahang; Robinson & Wray 5304 *pro parte* (G. Tahan), Haniff & Nur 8115 (G. Tahan, ca. 1300 m.), Ridley 16244 (G. Tahan 1300 m.).

Trengganu; Moysey 33360 (G. Padang, ca. 1300 m.).

The leathery leaves with extremely attenuate base, stout petiole and coarse reticulation and the mountain habit distinguish this species, the range of which is curiously limited. I believe that one may say that it occurs only in the mid-mountain forest on the quartzite ridges of the Tahan-group of mountains from G. Padang on the Trengganu boundary westward to the Telom River. Nevertheless, there are some Bornean collections from sea-level—one, indeed, from the sea shore—which bear a strong resemblance to this species though I prefer to classify them with *I. javanica*, viz. Kloss 19136, For. Dept. B.N.B. 4037, 4256, 4276 (vide *I. javanica* var. *retinervia*).

On the type sheet of *I. Robinsonii* in the Singapore Herbarium there are two specimens, one each of the two form of flower-size. As Ridley described the corolla tube as 2″ long, one should regard my 'Form 2' as the type. Ridley's statement that the corolla has 5 lobes is erroneous.

Our collection are yet too few to say if the species is as variable in size of flower as the other red Ixoras.

I. Scortechinii King et Gamble — Dwarf Red Ixora

Mat. Fl. Mal. Pen. IV, *1904*, p. 154.

Synonyms:—

I. humilis K. & G., loc. cit. non *I. humilis* O. Kze *(1891)*.

I. Kingiana Craib, Fl. Siam. Enum. II, *1934*, p. 159.

I. humilis var. *Scortechinii* Ridley, Fl. Mal. Pen. II, *1923*, p. 95.

A dwarf, evergreen, little-branched or unbranched shrub up to ½ m. high, the stem sometimes decumbent with a few upright branches: *leaves tufted at the top of the stem* with the internodes more or less concealed by the overlapping leaf-bases.

Leaf-blade 13–36 × 5–18 cm., *elliptic to obovate, simply pointed or subacute,* generally rather blunt, *narrowed to the widely or narrowly cordate, base, generally subsessile,* broadest at or above the middle, dull green: *lateral veins* 11–21 pairs, passing obliquely forward and distinctly inarching near the margin: *petiole* 0–5 mm. long, *generally concealed by the cordate leaf-base:* stipular point 1–5 mm. long.

Corymb 4–9 cm. wide, terminal, *subsessile, very dense,* with red branches: sepals subacute: *corolla-tube* 2–4·5 cm. long: *corolla-limb* 1–2·75 cm. wide, *the petals* ·5–·85 cm. wide, *broad, rounded, blunt, pinkish yellow or orange pink generally deepening to brick-red.*

Distribution:—Malaya (Pahang, Perak, Trengganu, Kelantan, Penang, Province Wellesley).

Syntypes:—As given by King and Gamble.

var. **caulescens** var. nov.

A typo differt caule evoluto, usque 2¼ m. alto, internodis distinctis, corymbis terminalibus vel lateralibus longe pedunculatis (pedunculis 4–10 cm. longis) haud congestis.

Distribution:—Malaya, Lower Siam, (Selangor to Patani).

Typus: Hume 7940 (Selangor, Semyih, 13.7.21).

King and Gamble distinguished two species on the basis of the number of primary lateral veins to the leaf, namely *I. humilis* (15–18 pairs) and *I. Scortechinii* (8–12 pairs). I find that some collections have 11–16 prs. of veins, and others have 14–21. I have also seen plants with 11–14 prs. of veins on small leaves and 16–21 pairs on large leaves. But in no case have I seen as few as 8. King and Gamble referred, moreover, Curtis 400 and Wray 4157 to both species. The distinction seems to me inconsistent and therefore I have reduced both species, following Ridley, but have been obliged to re-install the binomial *I. Scortechinii* as the earliest legitimate name. Accordingly, Craib's later binomial *I. Kingiana* becomes a synonym.

Craib has given Penang as the type-locality of *I. humilis* K. & G., but these authors indicated no type, having cited six collections which must be taken as syntypes. Likewise there is no holotype of *I. Scortechinii* but 5 syntypes. Of the syntypes of *I. humilis* K. & G. I remove one (Ridley 7422a) to my variety *caulescens*.

This variety *caulescens* is abundantly distinct both in the herbarium and the field. It has the habit of a slender plant of *I. congesta* but the cordate, subsessile leaves and broad blunt petals of *I. Scortechinii*. There can be no doubt that *I. Scortechinii* is closely related to *I. congesta*, perhaps even derived directly from it, and therefore var. *caulescens* appears to retain its ancestral habit while typical *I. Scortechinii* has declined into a dwarf. The distribution of *I. Scortechinii* is curiously limited to the northern half of Malaya and that of var. *caulescens* scarcely exceeds it.

I. Scortechinii inhabits the dense, lowland forest. It is in cultivation at Singapore, where it makes a good front to a shady path or rockery, but it will not tolerate the open. In the size of the flower, perhaps also in the colouring, it is as variable as the other red-flowered species *I. congesta*, *I. javanica* and *I. Lobbii*.

KEY TO THE VARIETIES AND FORMS OF *I. SCORTECHINII*

Stem up to ½ m. high, leaves crowded at the top: corymbs sessile	*I. Scortechinii*
Corolla-tube 2–2·5 cm. long	
Limb 1–1·3 cm. wide: petals ·5 cm. wide ..	Form 1
Corolla-tube 2–3·8 cm. long	
Tube 2–3 cm. long: limb 1·3–1·6 cm. wide: petals ·5–·65 cm. wide	Form 2
Tube 3–3·8 cm. long: limb 1·8–2 cm. wide: petals ·6–·75 cm. wide	Form 3
Corolla-tube 3·8–4·5 cm. long	
Limb 1·8–2 cm. wide: petals ·5–·65 cm. wide	Form 4
Stem 1–2¼ m. high, with distinct internodes: corymbs with peduncles 4–10 cm. long ..	var. *caulescens*

Corolla-tube 3·2–3·8 cm. long
Limb 1·5–1·8 cm. wide: petals ·5–·6 cm. wide — Form 5
Limb 2–2·3 cm. wide: petals ·6–·9 cm. wide — Form 6
Limb 2·3–2·8 cm. wide: petals ·6–·9 cm. wide — Form 7
Corolla-tube 3·8–4·5 cm. wide
Limb 2·3–2·8 cm. wide: petals ·7–1 cm. wide — Form 8
Limb 1·8–2 cm. wide: petals ·5–·65 cm. wide — Form 9

Collections

I. Scortechinii (typical)

Form 1
Penang; Curtis s.n.: Perak, Wray 4157 (syntype).

Form 2
Penang; Curtis 400 (syntype): Province Wellesley, Burkill 6596.

Form 3
Perak; Ridley 7186 (syntype): Pahang; Burn Murdoch 215 (21.6.13): Kemaman; Corner s.n. (cult. Hort. Bot. Sing: flowers becoming pinkish orange, never red).

Form 4
Trengganu; Corner 25836 (the flowers of this form appear to be persistently orange pink).

Specimens without flowers:—Province Wellesley; W. Fox's Collector s.n., Ridley 6992 (syntype): Pahang; Henderson 25081.

var. *caulescens*

Form 5
Pahang; For. Dept. Mal. Pen. 20364: Selangor, Ridley 8234.

Form 6
Selangor; Ridley 7422a (syntype of *I. humilis* K. & G.).

Form 7
Selangor; Ridley 7422, Hume 7770A, 7940 (type).

Form 8
Patani; Machado s.n. Sept. 1893.

Form 9
Kelantan; Henderson 19518.

Specimens without flowers:—Kelantan; Haniff and Nur 10110, Henderson 29660: Perak; Corner s.n. 22.8.37.

I. umbellata Koorders et Valeton — Malayan White Ixora

Bijdr. Booms. Java 8, *1902*, p. 162.
Baumart. Java, IV, t. 550.
Ic. Bog. II, t. 183.
Bot. Mag. t. 8577.

Synonyms:—

? Pavetta Korthalsiana Miq., Ann. Mus. Lugd. Bat. 4, *1868–9*, p. 197.

I. Korthalsiana (Miq.) Boerl., Hand. Fl. Ned. Ind. 2, *1891*, p. 135.

non *I. Korthalsiana* Kurz, Journ. As. Soc. Bengal 46 (ii), *1877*, p. 149. (= *Pavetta calycina* Korth. non *I. calycina* Thw.).

A shrub or treelet up to 6 m. high, glabrous except for the puberulous branches of the inflorescence, the hairy corolla-mouth and the puberulous corolla-tube: twigs pale.

Leaf-blade 13–33 × 5–13 cm., *elliptic, acuminate* or simply pointed, occasionally subacute, narrowed gradually to the base, drying light greenish: *side-veins* 12–20 pairs, not inarching or only vaguely with reticulations, the secondary veins coarsely

and conspicuously reticulate in the dried leaves: *petiole* 6–20 mm. long, rather stout: *stipular point* 1–4 mm. long.

Corymb 8–17 cm. wide, almost sessile or with a peduncle up to 4·5 cm. long, the branches articulate, puberulous and slender (1–2 mm. wide): *bracts* 3–7 × 1·5–2·5 mm., *linear lanceolate, green,* narrowly leafy with minutely ciliate edge: *bracteoles and sepals* 3–6 × 1·5–3 mm. long, oblong, obtuse or subacute, minutely ciliolate on the edge, green, like tiny leaves, the sepals unequal: *flowers white, fragrant: corolla-tube* 2·5–4 cm. long, white, *puberulous externally, the mouth sparsely to thickly bearded with white hairs: petals* 6–10 × 3–5 mm., *white,* oblong-elliptic, *obtuse:* anthers yellow: style green: *bracts, bracteoles and, generally, the sepals caducous in the infructescence.*

Distribution:—Malaya, Borneo, Java, ?Sumatra.

Type:—**Hallier 719 (Java)**.

Collections:—

Perlis; Henderson 23027 (det. *I. crassifolia*), Ridley 14999a (det. *I. multibracteata*).

Kelantan; Henderson 19615 (det. *I. Kingstonii*).

Perak; Wray 3953 (det. *I. multibracteata*).

Pahang; Burkill 996 (det. *I. multibracteata*), Corner s.n. 11.6.32 (Pulau Tioman), Henderson 21677 (det. *I. multibracteata*), Nur 18754 (det. *I. multibracteata*).

Selangor; Kloss s.n. Feb. 1912 (det. *I. Kingstonii*) Ridley 8570, s.n. July 1897 (Gua Batu).

Johore; Corner 28489 (det. *I. Kingstonii*), 30685, Henderson 18219 (det. *I. multibracteata*), Ridley 12199 (det. *I. Kingstonii*).

Singapore; Ridley 15463.

Borneo; Mondi 219 (Karimata Archip.) (det. *I. Korthalsiana* Val.), Hallier 381 (det. *I. Korthalsiana* Val. and *I. umbellata*).

In the Eastern half of Malaya, this species is rather common by streams in the lowland forest. I have found it abundant in the sandy coastal woods in the East of Johore. The Malayan specimens have been identified mostly with *I. multibracteata* which I consider a distinct variety with larger bracts and sepals. Though I have not seen the type of *I. umbellata,* the original description and the three illustrations leave no doubt of the identity of the Malayan specimens. The white fragrant flowers, the large green leafy sepals and bracts, and the many-veined rather large leaves together characterise the species. It has been generally supposed related to *I. congesta* but the resemblance is superficial and suggests how little the genus can be interpreted from the herbarium.

Concerning *P. Korthalsiana* I am uncertain because there is no figure or recent description of it, though both Bornean specimens which I have cited were identified with it by Valeton.

The corolla tube and petals are very variable in length in different collections, so that it is impossible to define the species narrowly on flower-size.

var. **multibracteata** var. nov. Lesser Malayan White Ixora

Synonym:—

I. multibracteata King and Gamble, Mat. Fl. Mal. Pen. 4, *1904*, p. 148.

Leaf-blade rather smaller and narrower (? always) 8–30 × 3–10 cm., narrowed gradually to each end, the apex not acuminate, often subcoriaceous, dark glossy green with wavy edge: *side-veins* 10–15 pairs, generally fewer, the reticulations often faint: *petiole* up to 1·5 cm. long.

Peduncle of corymb up to 2·5 cm. long: *bracts, bracteoles and sepals larger: bracts* 8–12 × 5–10 mm., *ovate*, shortly acuminate or acute: *bracteoles and sepals* 6–12 × 4–7 mm.: *corolla-tube* 2·5–3·5 cm. long, *glabrous or sparsely puberulous outside, the mouth glabrous or hairy.*

Distribution:—L. Siam, North Malaya.

Syntypes:—As enumerated by King and Gamble.

Collections:—

Siam; Curtis 2954 (syntype).

Kedah; Curtis 3408 (syntype), Ridley 5540 (syntype), 15887.

Perlis; Henderson 23049, Ridley 14999.

Perak; Corner 31640, Wray 3317 (syntype).

The larger bracts and sepals distinguish this variety from typical *I. umbellata*. The difference is at first so striking that no doubt it led King and Gamble to overlook the resemblance of their species to Valeton's. Nevertheless the difference is barely double the linear dimensions of the parts, and little more than one finds in the variation of the size of the corolla, or of the sepals, in other species such as *I. concinna* and *I. Lobbii*, though in these, the sepals being much smaller, the variation is almost microscopic. Moreover fruiting specimens, from which the bracts and sepals have been shed, can be distinguished from those of typical *I. umbellata* only by a close comparison of the venation which reveals slight differences between the two which cannot be rendered in words: and, even so, I doubt if anyone could infallibly distinguish such.

Whether this variety is wide-spread in Malaya has still to be discovered. I have seen it only in villages where it is rather frequent from Ipoh northwards. Mr. J. N. Milsum informs me, however, that it occurs wild in the forest on the road to Grik.

I. undulata Roxb.

Fl. Ind. I, *1820*, p. 395.

This species is recorded as occuring in Malaya both by King and Ridley. The record is based on the collection, Wray 3934, which is *I. micrantha*, as I have shown under that species. There is no evidence that *I. undulata* is wild in Malaya.

Ixora Sunkist nom. hort. nov.

A dwarf bush up to 1 m. high, glabrous, flowering throughout the year.

Leaf-blade 1·7–8 × ·7–2·5 cm., *small, subsessile,* lanceolate elliptic to lanceolate obovate, acute or subacute, *the base gradually or rather suddenly narrowed,* subcoriaceous, rather dull and yellowish green; side-veins 6–13 pairs, directed obliquely forward and distinctly inarching near the edge: *petiole* ·1–3 cm. long: *stipule-point* ·1–3 cm. long.

Corymb 5–10 cm. wide, as in *I. chinensis,* the branches red: *sepals* as in *I. chinensis,* blunt to subacute: *corolla-tube* 2·2–3·3 cm. long, the limb 1·3–2·5 cm. wide, the *petals* ·2–3 cm. wide, *lanceolate acute or subacute, pinkish apricot-yellow turning brick red.*

This description is based on specimens cultivated in Malaya, probably introduced from southern China, but their origin is unrecorded. They do not match any description I have seen. Pending a decision on their botanical status, I give to them the fancy garden name Sunkist. They grow best in the full sun and the round inflorescences are not unlike oranges in shape and colour. I find that there are two forms:—

1. leaves with 6–9 pairs of side-veins: corolla-tube 2·2–2·5 cm. long, the limb 1·3–1·6 cm. wide.
2. leaves with 8–13 pairs of side-veins: corolla-tube 3–3·3 cm. long, the limb 2–2·5 cm. wide.

As I have remarked under *I. chinensis,* this Ixora is what one imagines a hybrid of *I. chinensis* and *I. javanica* or *I. Lobbi* would be like. It has the foliage of *I. chinensis* and pointed petals of *I. coccinea.*

Summary

The following new varieties of Ixora are described:—

I. coccinea var. *decolorans,* var. *aureo-rosea,* and var. *rosea.*

I. grandifolia var. *lancifolia.*

I. javanica var. *multinervia,* var. *paucinervia,* and var. *retinervia.*

I. Lobbii var. *stenophylla.*

I. Scortechinii var. *caulescens.*

I. umbellata var. *multibracteata.*

"Ixora Sunkist" (a horticultural name).

PALMAE MALESICAE

IX.—TWO NEW CORYPHACEOUS GENERA IN MALAYA

By C. X. FURTADO,
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1. General Remarks

While arranging, in the Singapore Herbarium, the specimens of the Malayan palms having fan-shaped leaves, I detected many anomalous characters in the specimens referred to *Livistona rupicola* Ridl. The petiole is not prolonged as a thick rachis into the lamina but ends in numerous, almost equal, primary ribs or costae of the lamina. Further the spadices or flowers are usually unisexual, the segments of the perianth are imbricate, and the three carpels of the ovary are free almost to the base and are provided with free styles.

These characters are sufficient to remove the specimens from the section to which the genera Licuala and Livistona belong and place them in a different section together with Trachycarpus and Chamaerops. The genus Trachycarpus is not recorded from any tropical regions, it being confined to sub-temperate regions from N. W. Himalaya to Tibet, Assam, Burma, Indo-China, China and Japan. It is closely allied to Chamaerops, which is confined entirely to the Mediterranean countries as far as Persia, and with which Trachycarpus is sometimes united. However BECCARI (Ann. Roy. Bot. Gard. Calc., XIII, 1933, pp. 7, 253 & 272) has shown that Chamaerops has ruminate seeds, and Trachycarpus non-ruminate ones grooved on the raphal side with a more or less deep intrusion of the integument. The Singapore specimens referred to *L. rupicola* have no mature fruits, but the seeds of the very young fruits present seem to agree with the description of the fruits of Trachycarpus. However the flowers exhibit details on which the specimens can be arranged into two definite groups, neither of which belong to Trachycarpus or Chamaerops.

The specimens in the first group are all from the limestone hills in the Langkawi Islands and have their stamens united into a conspicuous epigynous cup as in Licuala, whereas in Chamaerops the stamens are united into a small hypogynous cup and in Trachycarpus they are entirely free. These Langkawi specimens are made here the basis of a new genus **Liberbaileya** named in honour of the American palm specialist Prof. L. H. BAILEY. Its type species has been named here as **L. lankawiensis** Furtado to show the exact area where it is native. The imbricate perianth and the staminal cup would make the genus a close ally of the American palm genus Acanthorhiza.

The specimens of the second group are from the limestone hills in Selangor and are referred here to a new genus **Maxburretia,** named in honour of the European palm specialist Prof. M. BURRET. These specimens are generically distinguished from Liberbaileya by their stamens being epipetalous; and were it not for their free styles and imbricate perianth, Maxburretia would have been a close ally of Livistona and Rhapis. The type species of this new genus is **M. rupicola** (Ridl.) Furtado (*Livistona rupicola* Ridl. *emend.* Furtado). The generic description is derived not from the lectotype of *M. rupicola,* but from its apotype, NUR 34370.

Liberbaileya lankawiensis is a caespitose palm producing, under favourable conditions, a stem 10 ft. high. Its leaf-blade is small, about 1–1½ ft. in diameter and bears, as in some varieties of *Chamaerops humilis,* small punctiform brown marks all over in the lower surface. The flowers are arranged in groups of 3–5 on a simple spadix which bears two or three spathes in the peduncular parts and many, scattered, simple or divided flower-bearing branchlets at the apex. On the other hand, *Maxburretia rupicola* is apparently a stemless or scarcely caulescent, solitary palm; it produces larger leaves with no brown marks in their lower surface, compound spadices with 4–6 partial inflorescences, and one separate spathe at each internode, and usually solitary flowers (rarely in groups).

Both these species have unarmed petioles, thus differing from both Chamaerops and Trachycarpus and resembling the American genera Trithrinax and Acanthorhiza. The spadices in both these new genera appear to be dioecious, though traces of polygamous spadices have also been observed.

Since both these genera are confined only to the limestone hills in the Peninsula and have no allies in its immediate neighbourhood, it is reasonable to suppose that they are vestiges of an ancient flora of the Peninsula; and since the nearest allies are in America, in the sub-temperate regions of Asia and in the Mediterranean countries, it seems reasonable also to suppose these two Malayan genera are immediate descendents of a stock that existed somewhere at the Cretaceous period and that gave rise also to Chamaerops, Trachycarpus, Acanthorhiza, etc.

The fact that in some cases open limestone vegetation produces conditions favourable for the growth of plants of colder or seasonal climates or of higher altitudes (cf. KRASAN in Engl., Bot. Jahrb. II, 1882, pp. 240 & 249–250; VAN STEENIS in Bull. Jard. Bot. Buitenz. XIII, 1935, p. 296) might account for the persistence of these two genera in the Peninsula only on the limestone hills. This hypothesis would also explain why HENDERSON (Journ. Roy. As. Soc. Malayan Br. XVII, 1939, pp. 13–87) found that almost all

the genera occurring in the peninsular limestones, if not common in the Peninsula, represented the southernmost extension of the range of the genera found in the north of the Peninsula as in Thailand, Burma and Indo-China. On the other hand, the absence of these two palm genera or their very close allies in the countries lying immediately to the north of the Peninsula might be more apparent than real, for botanically these regions are very imperfectly known, especially as regards the occurrence and the distribution of palms; further explorations may reveal in the area the existence of these two new genera or their close allies.

However, there are cases, though very rare, where genera or species occur in the Peninsula only on the limestone hills and in distant temperate and sub-temperate climates but not in other parts of the Peninsula or in countries lying in the immediate neighbourhood of the Peninsula. Thus the genus Pistacia (ANACARDIACEAE) which has a wide distribution from the mountains of Luzon and Formosa to China, westwards to Yunnan, Upper Burma, Himalayas, Afghanistan, the Mediterranean region, and the Canaries in the Old World and in Texas and Mexico in the New World, is represented by *Pistacia malayana* on the limestone hills of Selangor and Upper Perak in the Peninsula, though the genus has so far not been recorded either from Lower Burma, Thailand and Indo-China, or from the northern parts of the Peninsula.

2. Systematic Notes

A. **Liberbaileya** Furtado **gen. nov.** (CORYPHOIDEAE)

Palmae nanae, dioceae vel polygamae, caespitosae vel solitariae. *Petioli* inermes, apice in costas aequicrassas vel fere in lamina producti. *Laminae* frondium flabelliformes. *Spadices* interfoliares, simplices (semper?); flores unisexuales vel hermaphroditi. *Tepala* imbricata; calyx brevior quam corolla. *Stamina* 6, in annulum conspicuum unita ut in LICUALA. *Carpella* 3, libera. *Fructus* erectus, semine aequabile(?).

1. **Liberbaileya lankawiensis** Furtado **sp. nov.**

Caulis humilis, ad 3 m altus, caespitosus vel non, inferne annulatus superne infra coronam foliarum vaginibus fibrosis caulem amplectantibus, nigris, tectus. *Petiolus* inermis, metralis, semiteres, utrinsecus angulatus, apice ut rachis haud productus, sed in uno latere in ligulam parvam et in altero latere in costas aequicrassas vel fere terminatus. *Lamina* frondis 25–40 cm. longa, ¾–orbicularis basi cordata, subtus glaucescens fusco punctulata, junior ⅓–orbicularis basi cuneata; segmentis 25–30, unicostulatis, apice cuneatissimis, acutis, pungentibus vel breviter bifidis, basi ad 5–12 cm. connatis. *Spadix* gracilis, unisexualis vel polygamus,

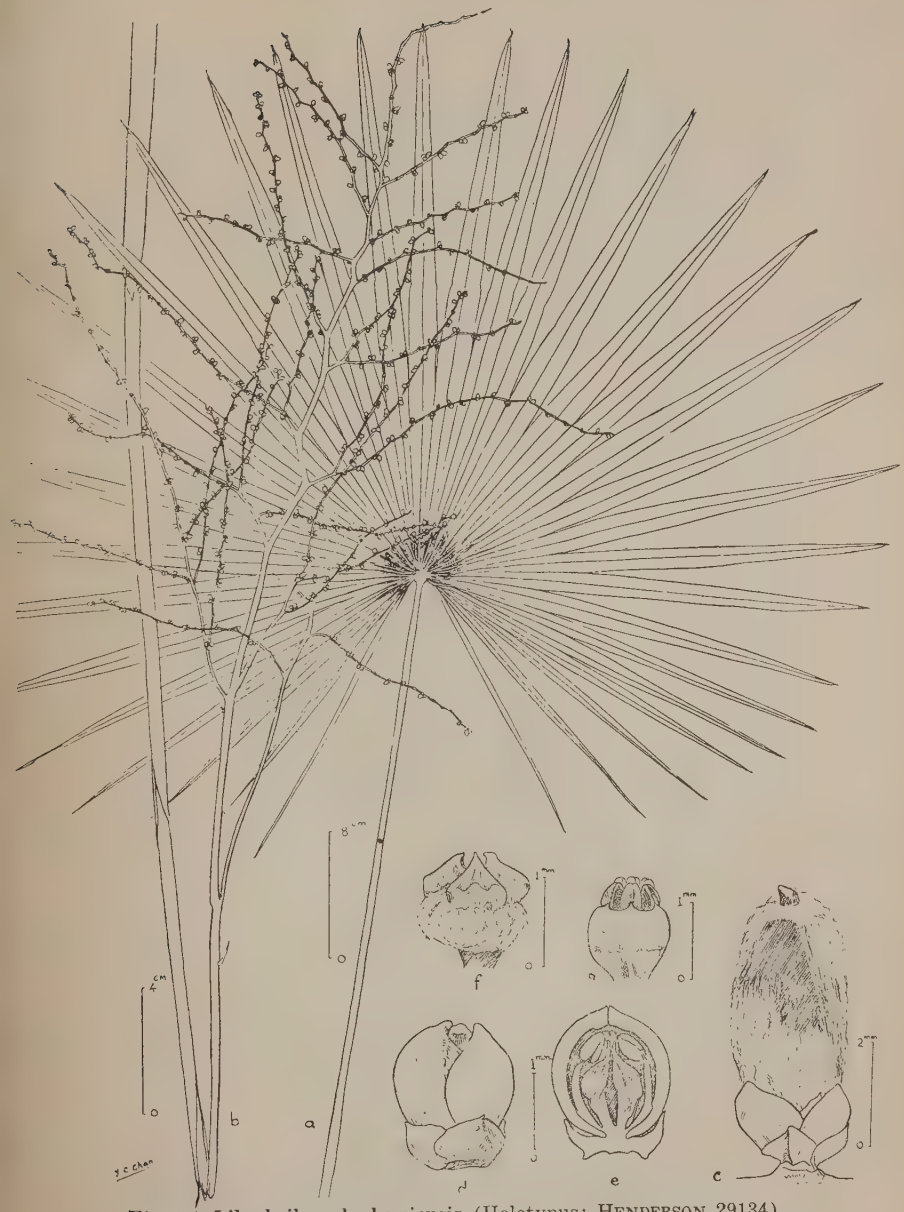

Fig. 1. **Liberbaileya lankawiensis** (Holotypus: HENDERSON 29134). **a.** Folium cum parte petioli superiore. **b.** Spadix integer. **c.** Fructus juvenilis. **d.** Alabastrum. **e.** Alabastrum verticaliter discissum. **f.** Carpella. **g.** Alabastrum, tepala resecta ut aestivatio staminum appareat.

simplex, circa 80 cm. longus, inferne ad 50 cm. pedicelliformis, cum spathis 2–3 bicarinatis, tubulosis, gramineis, plus minusve striatis apice oblique truncatis, acutis vel bifidis involutus, et interdum infra partem ramosam 1–2 bracteolos liguliformes vel lineares ferens; superne in ramos remotos simplices vel ramulosos primo dense pubescentes tarde puberulos vel glabros, plerumque in axilla bracteoli orientes terminatus. *Flores* feminei, vel interdum hermaphroditi, oblongi, 2 mm. longi, 1·2 mm. crassi, in glomerulos distantes spiraliter dispositos 3–5 aggregati; flores masculi ignoti. *Calyx* circa 0·8 mm. longi, glaber, rugosus sepalis late ovato-reniformibus, imbricatis. *Corolla* calyce duplo vel triplo longior, glabra, striata, petalis oblongis, imbricatis. *Stamina* vel staminodia 6, in annulum membranaceum conspicue unita. *Carpella* 3, ventricosa, dense pubescentia, libera, in stigma glabrum abrupte terminata. *Fructus* juvenilis tantum visus, erectus, vestigio stylare apicale vel paulo excentrico; semen aequabile(?).

Malay Peninsula: *Langkawi*, Pulau Dayang Bunting in collina calcarea (Henderson, 29134, Holotypus; Curtis, 2661, vern. nom. Serdang Batu); loc. incert. (Fox in Dec. 1904).

Hermaphrodite flowers which are also seen in this species resemble the female flowers. The fruits are too young for an investigation into the nature of the albumen, the position of the embryo, etc.; in the shape and arrangement of the perianth and of the young developing ovaries this species appears to be like *Maxburretia rupicola*.

Curtis mentions that the stems reach a height of 6–10 ft., and Henderson notes that they attain about 10 ft. amongst dry rocks, but that the plants are dwarfed when growing in cracks of the rocks near the sea. That the palm is caespitose has not been recorded by any of the collectors; but I have noticed this character in a plant growing in the Botanic Gardens, Singapore.

B. **Maxburretia** Furtado **gen. nov.** (Coryphoideae)

Palmae dioeciae, nanae vel acaulescentes. *Petioli* inermes, apice in costas aequicrassas in lamina producti. *Laminae* frondis flabelliformes. *Spadix* interfoliaris, unisexualis, in inflorescentias partiales divisus; flores solitarii vel glomerati. *Tepala* imbricata; calyx brevior quam corolla. *Stamina* 6, epipetala. *Carpella* 3, libera. *Fructus* erectus; semine erecto; albumine aequabile; intrusione integumentali brevi, ad latus raphale sito.

Specimen typicum Nur 34370.

1. **Maxburretia rupicola** (Ridl.) Furtado **comb. nov.**

Livistona rupicola in Journ. Roy. Asiat. Soc. Straits Settl. XLI (1903) 41 et Mat. Fl. Malayan Pen., Monocot., II (1907) 16: *partim;* Becc. in Webbia V (1921) 16 et 20

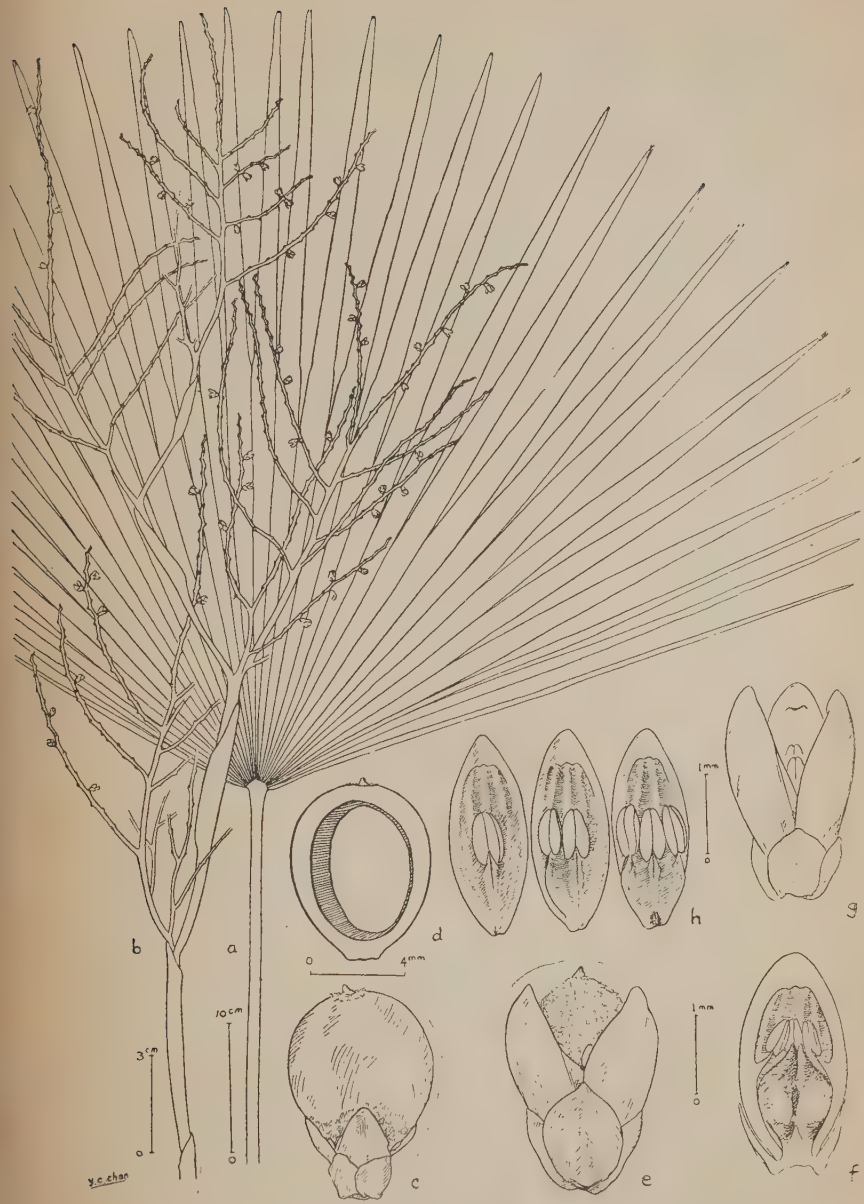

Fig. 2. **Maxburretia rupicola** (Apotypus: NUR 34370).
a. Folium cum parte petioli superiore. **b.** Pars spadicis feminei. **c.** Fructus juvenilis. **d.** Fructus verticaliter discissus ut albumen integumentumque appareant. **e.** Flos femineus post anthesin. **f.** Flos verticaliter discissus. **g.** Alabastrum. **h.** Petala cum staminibus.

(§ LIVISTONELLA) ; Ridl., Fl. Malay Pen. V (1925) 23 p.p.; Becc. in Calc. Annals XIII (1933) 105 t. 53 (§ LIVISTONELLA) ; Henderson in Journ. Roy. Asiat. Soc. Malayan Br. XVII (1939) 85 p.p. (ex altera parte = *Liberbaileya lankawiensis*).

Planta nana, vel acaulescens, solitaria (semper?), dioecia. *Petiolus* metralis, semiteres, inermis, postice convexo planus, untrinsecus angulatus, apice in costas fere aequicrassas in lamina percurrens, basi vagina fibrosa, brunneo-nigrescente, liguliforme, 10–20 cm. longa, caulem amplectante, in senectute in fibras persistentes soluta. *Lamina* frondis 50–60 cm. longa, flabelliformis, $^1/_3$-orbicularis, subtus albescens, basi cuneata, apice in lacinias acutas 12–18 cm. longas, aut 30–35 unicostulatas 2 cm. latas, apice bifidas, aut pauciores, latiores, 2–4 costulatas, apice tot fidas quot costulas. *Spadix* unisexualis, 45–60 cm. longus, masculus femineo longior, in 4–6 inforescentias partiales, pubescentes, masculas femineis ramosiores, divisus. *Spathae* brunneae, glabrae, valde striatae, acutae, vel acuminatae, interdum bifidae. *Flores* solitarii, rarissime 2–3 glomerati, spiraliter dispositi; masculi circa 2·5 mm. longi, lineares vel obovato-oblongi, 0·8–1 mm. crassi; feminei ovato-oblongi paulo minores masculis. *Calyx* circa 0.8 mm. longus; sepala imbricata, ovata, acuta, rugosa. *Corolla* calyce triplo longior; petala striata, imbricata. *Stamina* 6, petalis paulo breviora, epipetala, filamentis subulatis, antheris cordatis. *Staminodia* petalis valde minora, 6. *Carpella* 3, valde ventricosa, fusiformia, dense sericea, 1–3 fertilia, singula in stylum conicum liberum glabrum subito contracta; stigmate punctiforme. *Carpellodia* minuta, glabra. *Fructus* juvenilis tantum visus, glaber, erectus, obovato-oblongus; semine erecto; albumine aequabile; intrusione integumentali breve; embryone non viso; vestigio stylare apicale vel paulo excentrico.

MALAY PENINSULA: *Selangor* (Gua Batu, Ridley 8285, Lectotypus) ; Batu Takun prope Kanching (Nur, 34370, Apotypus).

RIDLEY notes that this produces a stem about 3 ft. high and 6 inches through; but NUR informs me that he found it always stemless and solitary. The situation of NUR'S collection was steep, exposed limestone rocks where the vegetation usually makes a poor growth.

The basinym, *L. rupicola,* was based on two specimens, one collected at Gua Batu by RIDLEY and the other in the Langkawi Islands by CURTIS. As the two specimens represent two distinct species, and as the Gua Batu one appears to have been the principal basis of the description given by RIDLEY, I have typified the species on the last named specimen, making the other specimen the paratype of *Liberbaileya lankawiensis.*

The leaf in RIDLEY 8285 contains 2–4 costulate segments; and since this was unusual in the genus Livistona except in juvenile stages, BECCARI employed the character to create the section LIVISTONELLA under Livistona. But the many stages represented in NUR'S collection lead me to conclude that the degree of leaf division in RIDLEY 8285 represents that of young plants.

There are no flowers in the lectotype preserved in Singapore, a reason why BECCARI failed to discover the erroneous generic identity made of the specimen by RIDLEY. However NUR 34370 has supplied the important diagnostic characters lacking in RIDLEY 8285, for which reason NUR'S specimen has been called here the Apotype of the species (for the definitions of the nomenclature of types, *see* FURTADO in Gard. Bull. Straits Settl. IX, 1937, pp. 285–309).

ALOCASIA MACRORRHIZA AND ITS VARIETIES

By C. X. FURTADO,

Botanic Gardens, Singapore

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1. Introduction

The binomial *Alocasia macrorrhiza* has been used in more than one sense. Some of the plants which have passed under this name are economically very important and found in cultivation or as escapes in the tropics of both hemispheres; others are of little economic value and not known in cultivation or as escapes except in their native country and perhaps in some botanic gardens. Further, many experiments and analyses have been made in order to test their value as food to men and animals, and the results have been sometimes conflicting. The existence of many varieties in some of the species called by this name is also a factor that has caused further ambiguity. The present paper is an attempt towards the clarification of this ambiguity.

It is my pleasant duty to record here my thanks to Dr. R. C. BAKHUIZEN VAN DEN BRINK, Agricultural Department, Buitenzorg, Dr. G. J. A. TERRA, Horticultural Division, Batavia, Dr. C. G. G. J. VAN STEENIS, Botanic Gardens and Herbarium, Buitenzorg, Dr. K. BISWAS, Royal Botanic Gardens, Calcutta, and Mr. E. F. ALLEN, Agricultural Department, Teluk Anson, Perak, for procuring for me planting material of the species and varieties connected with the nomenclatural problems of *Alocasia macrorrhiza* and its varieties; without this material it would have been impossible for me to clear many difficulties discussed in this paper.

2. The Authorship of the Name

The genus Alocasia was published first by NECKER, Elem. Bot. III (1791 p. 289), a work proposed for rejection by some botanists (*see* FURTADO, 1937, p. 252 footnote).

But whether by rejecting this we should also reject *A. macrorrhiza* (L) Sweet and *A. cucullata* (Lour.) Sweet I have not been able to investigate; both these names have been recorded with their respective basinyms in STEUDEL'S Nomenclator Botanicus ed. 2, vol. I (1840), though the authorities so far consulted by me attribute these combinations to SCHOTT (1854). No doubt in Index Kewensis these two combinations have been recorded as if they were published by SCHOTT et ENDLICHER in their Meletemata I (1832 p. 18); but this is an error, for there Alocasia was accepted only as a section of Colocasia. Since NECKER'S work is not yet rejected, I propose in this treatment to follow STEUDEL and cite the name as *Alocasia macrorrhiza* (L) Sweet.

3. The Typification of the Species

Alocasia macrorrhiza (L) Sweet is an isonym derived from *Arum macrorrhizon*, a binomial coined by LINNAEUS in Species Plantarum ed. 1 (1753, p. 965) for a species from Ceylon. The specific prologue[1] given by LINNAEUS runs as follows:—

> "Arum acaule, foliis peltatis cordatis repandis: basi bipartitis: *Fl. Zeyl.* 327. *Roy. lugdb.* 7[?6]. Arum maximum macrorrhizon zeylanicum *Herm. par.* 73 1. 73. *Raj. Suppl.* 574. Habitat in Zeylona, perennis."

I have not been able to consult the last reference given by LINNAEUS. In the second reference the number "7" appears to be a misprint of "6", but in neither of these references (6 or 7) are the leaves described as peltate. In the third reference (Herm. Parad. Bat. p. 73, t. 73), the species is described and depicted with sagittate leaves. In Flora Zeylanica (the first reference given by LINNAEUS), reference is made to ROYEN'S (the second reference) and HERMANN'S (the third reference) species, but the plant is described as peltate-leaved.

I have not been able to consult two more books cited under the species in Flora Zeylanica, and so I do not know whether these references refer to any peltate-leaved species. However, there is evidence to show that the Linnean phrase "foliis peltatis, basi bipartitis" refers to sagittate leaves in the modern sense. Thus the sixth Arum in Hort. Cliff. p. 435, which is said in Flora Zeylanica to have the same appearance as *Arum macrorrhizon*, is described as having "foliis peltatis, ovatis, basi bipartitis", a description subsequently expanded to mean "modo latus foliis a petiolo

1. A PROLOGUE is the printed matter (description, etc.) accompanying the original publication of a name or epithet.—A. J. WILMOTT in Journ. Bot [London] LXXVII (1939) 206.

ad basin totum bipartitum" (RICHTER, 1840). LINNAEUS also described his *Arum peregrinum* in Hort. Cliff., p. 435, No. 7, as having leaves "folia peltata, cordata usque ad petiolum"; *Arum peregrinum* L. is an accepted synonym of *Alocasia macrorrhiza*.

The other alternative is to assume that LINNAEUS confused a species of Colocasia with *Alocasia macrorrhiza*, overlooking the warning given by HERMANN (1698, p. 74) in the following observation under his *Arum maximum macrorrhizon zeylanicum*, t. 73:

> "Idem *Arum* videtur quod COMELINUS in *Catal. Horti. Med. Amstel.* nominat *Arum maximum Ceylanicum radice crassa longa rotunda geniculata Colocasiae folio.* Welila *Hort. Malab. part. 13* nondum editae. Ast appellatio isthaec non arridet, Nostri enim folia nihil cum *Colocasiis* habent commune, sed forma ad *Arum* accedunt, pediculumque cui incumbunt non in medio sed extremo foliorum insertum habent."

Welila or Weli-Ila in RHEEDE'S Hort. Malab. XI, t. 22, is a special variety of *Colocasia esculenta* which produces long, thick, edible subterranean suckers, and it is possible for persons not acquainted with the plants to apply the description of the runners of this variety of Colocasia to the thick, edible, sometimes inclined, rhizomes of *Arum macrorrhizon* (quoad HERMANN'S plate).

But there is not the slightest evidence to support this view. On the contrary there are abundant reasons to justify the typification of *Arum macrorrhizon* on HERMANN'S plate 73: *(1) Arum macrorrhizon* has always been interpreted as a species of Alocasia and not of Colocasia (both genera in the modern sense); *(2)* "foliis peltatis, basi bipartitis" in Linnean sense probably means sagittate leaves with a somewhat acute sinus at base: *(3)* Flora Zeylanica, which supplied the definitive phrase cited under *Arum macrorrhizon* L., was based mainly on HERMANN'S herbarium (TRIMEN, 1887; BOULGER, 1900; ARDAGH, 1931; OOSTROOM, 1937); *(4)* HERMANN'S plate and description indicating an Alocasia with sagittate leaves was cited both in Flora Zeylanica and again independently in the prologue of *Arum macrorrhizon;(5)* the specific epithet *macrorrhizon* adapted by LINNAEUS was derived from HERMANN'S specific phrase-name quoted in the prologue of *A. macrorrhizon; (6)* there are no specimens of the species either in the Linnean herbarium in London (JACKSON, 1912), or in HERMANN'S collection in Leiden (OOSTROOM, 1937), and the drawing which exists in HERMANN'S herbarium in the British Museum, London, represents the same species as HERMANN'S plate; *(7)* the species depicted by HERMANN is a common species in Ceylon, specially in the lowlands where HERMANN made the bulk of his Ceylon collection

(TRIMEN, 1887; BOULGER, 1900); *(8)* no species of Alocasia having large peltate leaves has been discovered in Ceylon (PETCH, 1919; ALSTON, 1931).

4. Splitting the Species

The particulars given by HERMANN (1698) concerning the vernacular name and economic uses coupled with the description and the plate led some early botanists to interpret *Arum macrorrhizon* L. in the sense indicated by the present typification. Thus G. FORSTER (1786 & 1786 *bis*) identified as *Arum macrorrhizon*, the sagittate-leaved Alocasia cultivated in Ceylon, New Zealand and Polynesia for its edible stems and depicted by RUMPHIUS as *Arum indicum sativum*, Herb. Amb. V (p. 306, t. 106) (FORSTER gave an erroneous description of the flowers). ROBERT BROWN (1810, p. 192) also cited *Arum macrorrhizon* L., *A. maximum macrorrhizon zeylanicum* Herm. Parad. 73, t. 73, and *A. indicum sativum* Rumph. Amb. V (p. 308, t. 106) under his *Calladium ? macrorrhizon*, observing at the same time that both HERMANN'S plate and RUMPHIUS'S plate (without the spadix) were good representations of the plant in question.

LOUREIRO (1790), who was working in Cochin-China with a small library at his disposal, was probably not able to consult HERMANN'S Paradisus, or any other books which identified *A. macrorrhizon* with the large sagittate-leaved Alocasia furnishing edible stems. The Linnean statement that *A. macrorrhizon* was stemless had raised difficulties even to LINNAEUS, who suggested the possibility of *Arum indicum sativum* Rumph. being a different species, *Arum arborescens* (cf. STICKMANN, 1754). LOUREIRO was also misled by the phrase "foliis peltatis" used by LINNAEUS in the prologue of *Arum macrorrhizon*. Consequently LOUREIRO identified with the last a stemless species, having peltate leaves and [practically?] no appendix to the spadix (probably *Colocasia gigantea*), and named as *Arum indicum* the sagittate-leaved species depicted in the Rumphian plate 106 and cultivated also in Cochin-China for its edible stems.

The name *Arum indicum* of LOUREIRO was adopted by ROXBURGH (1832) for an edible *Alocasia* cultivated in Bengal. ROXBURGH found some difficulties in identifying *A. macrorrhizon* owing perhaps to the statement in the prologue that the species was stemless; he was thus inclined at first to identify *A. macrorrhizon* with *A. montanum* Roxb. (*see* ROXBURGH'S remarks under the latter op. cit., p. 497).

Since ROXBURGH had described *Arum indicum* in detail, giving its vernacular names and economic uses, and since ROXBURGH'S drawing of the plant was later published by

WIGHT (Ic. Pl. Ind. III, t. 794), the name *Arum indicum* and its isonym *Alocasia indica* became widely current in India for the plant cultivated in Bengal.

Since there were some discrepancies in the descriptions of *Arum indicum* Lour., *A. indicum* Lour. *sensu* Roxb. and *A. macrorrhizon* L., SCHOTT (1854) was inclined to consider these three descriptions as representing three distinct species. This view of SCHOTT was contested by KOCH (1854) who maintained that all these three represented but one single species. But SCHOTT'S opinion, after his defence in pointing out the discrepancies (1855) and the revision of all the Aroids then known (1860), was followed by many botanists, notably ENGLER (1879) and later by ENGLER & KRAUSE (1920).

MIQUEL (1855) seemed to have agreed with KOCH in reducing *Arum indicum* Lour. *sensu.* Roxb. to *Alocasia macrorrhiza,* but for some unaccountable reasons he also retained *Alocasia indica* with the synonym *Arum indicum* Lour. or Roxb. as the correct name for *Caladium giganteum* Bl.

PETCH (1919) pointed out that in Ceylon there is only one large-leaved species of Alocasia and that this should be called *A. macrorrhiza,* that specimens of this species from Ceylon were very rare in Europe, the only one he found being THUNBERG'S, and that the plants which pass in Ceylon as *A. indica* are cultivated species of *Xanthosoma.* ALSTON (1931) further pointed out that the only large-leaved Alocasia that occurs in Ceylon has sagittate leaves, that on geographical considerations the name *A. macrorrhiza* should be applied to this species, and that the real *A. indica* is probably a variety of *A. macrorrhiza.* ALSTON did not consider the problem either of the interpretation or of the typification of *A. macrorrhiza* on the original description of the species; nor did he consider whether *Arum odorum* Roxb. or *Caladium odorum* Roxb. *ex* Lindl. was a distinct species or not.

Perhaps influenced by the statements of ALSTON, MERRILL (1935), who had previously (1922) maintained *Alocasia indica* and *A. macrorrhiza* as specifically distinct, the former not occurring in the Philippines, considered *A. macrorrhiza, A. indica* and *Arum indicum* Lour., and *Arum indicum* Rumph. as representing the same species. He did not refer to the confusion of other species either with *A. indica* or with *A. macrorrhiza.*

5. Confusion with Alocasia odora

There is an Aroid growing wild in Burma, Khasia, China, etc. which has peltate leaves and which was described as *Arum odorum* by ROXBURGH (1832) and figured by

WIGHT (Ic. Pl. Ind. III, t. 797), This species was named by KOCH (1854) as *Alocasia odora* and by SCHOTT (1854) as *A. commutata*. It does not occur in Ceylon, Malaya, Polynesia, etc. either in cultivation or wild.

But ten years before the posthumous publication of the binomial by ROXBURGH (1832), LINDLEY (Bot. Reg., 1822, t. 641) published under *Caladium odorum* a Latin version of ROXBURGH'S manuscript description of *Arum odorum* and a plate which in general aspects of the plant appears to correspond to *A. indicum* of ROXBURGH, though the inside of the spathe is depicted green. ENGLER (1879) and ENGLER & KRAUSE (1920) who keep *Arum macrorrhizon* L. and *A. odorum* Roxb. as two distinct species with *Alocasia macrorrhiza* and *A. odora* as the correct names, identified *Caladium odorum* Lindl. in Bot. Reg., t. 641, as *A. macrorrhiza* which normally produces a whitish or yellowish spathe-limb.

Since the drawing of the entire plant in LINDLEY'S plate was made from the living plant, whereas the details of the spathe, spadix, flowers, etc. were drawn from the specimens communicated to LINDLEY, it might seem legitimate to suspect that the different colours in these detail figures were given in order to make them conform not with the colours of the material (which might have faded) but with the colours indicated by ROXBURGH'S description quoted. However, this explanation does not receive any support from the plate published of apparently the same species, by HOOKER in Bot. Mag., (1842), t. 3935, under the name of *Colocasia odorata;* in this plate the colour of the spathe agrees with that given by LINDLEY in Bot. Reg., t. 641. However, if the determination by ENGLER (1879) is correct, and ENGLER had examined practically all the available Aroid material in the great botanical institutions in England, it is possible that the peculiar colour variation is a product of the stove environment in which the plants are grown in Europe. The two plates are so poor that it is difficult to decide whether the identification made by ENGLER (1879) is right or not. There is, however, ample evidence to show that the name *A. odorum* and its isonyms were used from LINDLEY (1822) onwards in more than one sense, perhaps for any large-leaved Alocasia grown in hot-houses of Europe (cf. the synonymy given by ENGLER (1879) and ENGLER and KRAUSE (1920) under *Alocasia indica, A. macrorrhiza* and *A. odora*).

This indifferent use of the name *Arum odorum* and of its isonyms, and the misleading use of the word "peltate" by LINNAEUS in describing his *Arum macrorrhizon* must have led THWAITES (1864), TRIMEN (1885 & 1898), HOOKER (1893), RIDLEY (1907 & 1925), KOORDERS (1911),

HAINES (1924) and FISCHER (1931) either to describe *Alocasia macrorrhiza* as having peltate leaves or at least to reduce *Arum odorum* or *Alocasia odora* as its synonym, or to do both, and then maintain *A. indica* as a distinct species. The synonymy given by ENGLER (1879) and ENGLER & KRAUSE (1920) in order to show the different uses of *Arum odorum* or its isonyms was probably not understood because these authors failed to note that, though *Caladium odorum* Lindl., Bot. Reg. (1822), t. 641, quoad descriptionem was *Arum odorum* Roxb., *C. odorum* Lindl., Bot. Reg. (1822), t. 641, quoad tabulam was, in their opinion, a different plant identical with *A. macrorrhiza.*

HAINES (1924), who noted the differences given by ENGLER & KRAUSE (1920) between *A. macrorrhiza* and *A. odora* and who had opportunities to study *A. odora,* could not understand the distinction given by ENGLER & KRAUSE, chiefly because he failed to recognize that *A. macrorrhiza* sensu lato included the plants he described as *A. indica.* Hence HAINE'S remarks that, if one were to follow ENGLER & KRAUSE (1920), *A. macrorrhiza* should be used for Ceylon plants and *A. odora* for the Indian ones. ALSTON (1931), who pointed out certain discrepancies in the colour of the spathes of Bot. Reg. t. 641, and in those of the Ceylon plant, noted that the Ceylon plants referred to *A. macrorrhiza* have sagittate leaves and on geographical grounds appeared to be correctly named.

6. Confusion with Colocasia & Xanthosoma Species

In some parts of India, where *Alocasia odora* and *A. macrorrhiza* occurred, it was not difficult to use *A. macrorrhiza* for *A. odora,* and *A. indica* for *A. macrorrhiza.* But in Ceylon (PETCH, 1919; ALSTON, 1931) and in Malaya, where no Alocasia with a large rhizome and large peltate leaves occurs, the use of the two binomials, *A. macrorrhiza* and *A. indica,* would have been extremely difficult, had it not been for the fact that cultivated species of Xanthosoma were, owing perhaps to their edible tubers and large leaves, mistaken for Asiatic plants. Thus THWAITES (1864), TRIMEN (1885, 1898), WILLIS (1911) & PARSONS (1926) recorded *A. indica* for Ceylon as if it were an exotic plant existing only in cultivation, and made no mention of any Xanthosoma species which have been long in cultivation there. According to PETCH (1919) the vernacular names cited under *A. indica* by TRIMEN and others also suggest the cultivated Xanthosoma species of Ceylon. BARRETT (1910) also mentions his receiving Xanthosoma material from Singapore, Buitenzorg, etc., as *Alocasia indica, Alocasia violacea, A. macrorrhiza* and *A. javanica,* or as

Colocasia monorrhiza scriptum and *Colocasia antiquorum niger*. And I have received Xanthosoma material from Calcutta as *Alocasia violacea* (a binomial usually reduced as a variety of *A. indica*).

Many factors must have contributed to allow this masquerade of Xanthosoma spp. as *A. indica* to pass undetected for so long. The basal sinus of the leaves of the edible Xanthosoma spp. cultivated in the East is wide, and since that of *A. macrorrhiza* is very narrow and was described in most books as peltate, it was easy to take the Xanthosoma species with a wide leaf sinus as fitting with the description given under *A. indica*. Besides *A. indica* is described as a large-leaved plant cultivated for its edible tubers or rhizomes, a description also applicable to the species of Xanthosoma. Further, owing to the large size of the leaves, herbarium specimens of these plants are usually very poor and are rarely made. Moreover the cultivated Xanthosoma species flower but rarely and without flowers it is not easy for systematists to identify the plants, the general tendency in such cases being to identify the plants on their vernacular names, economic uses, the country of origin, etc. (a procedure eminently suited for perpetuating the confusion if already made). In species of both these genera there are many forms, some with violet petioles. In fact BARRETT (1910) experienced such great difficulty in distinguishing, on sterile material, the species of Xanthosoma from those of Alocasia that he evolved a key based entirely on the openness of the leaf sinus, a key that, while enabling him to identify correctly the best kinds of Xanthosoma in cultivation, misled him to classify under Alocasia some inferior kinds of Xanthosoma.

Apparently the confusion existing in several botanical works coupled with the absence of a satisfactory key to enable one to distinguish generically between these plants on vegetative characters led OCHSE (1931) to record under *Colocasia esculenta* some information received by him concerning the uses and the vernacular names of the cultivated varieties of Alocasia, Colocasia and Xanthosoma, and also to suppress altogether any discussion on Alocasia, though *A. macrorrhiza* plays a very important role in the diet of the peoples of the Netherlands Indies, much more important than many other plants discussed in the book, e.g. *Schismatoglottis calyptrata*. MACMILLAN (1935) considered all edible species of Alocasia and Xanthosoma as if they were generically identical and depicted a species of Xanthosoma with "*Alocasia* (Xanthosoma) *indica* var." for its legend, though he was personally inclined to regard all these edible species of Xanthosoma and Alocasia as varieties of *Colocasia esculenta*.

Such a confusion, very common in books written before the beginning of the twentieth century, has now decreased considerably, apparently due mainly to the writings of BARRETT (1910) and of ENGLER and KRAUSE (1920), who worked on many specimens derived from cultivated material in Asia and America and who quoted in some cases vernacular names.

7. Varieties

Some of the varieties here described are so distinct that it may be better to separate them as species or subspecies; however I have retained the varieties, firstly to show their affinities, secondly to warn systematists and agriculturists against the confusion so often made over these names, and thirdly to conform with current procedure. In horticulture all these varieties usually pass as species.

The varieties described below may be divided into two large groups: (1) one having the spathe very much longer than the enclosed spadices: vars. *typica* and *nigra;* and (2) the other having the spathes nearly as long as, or slightly longer than, the spadices: vars. *variegata, marmorata* (?), and *rubra.* There is a tendency to restrict the binomial *A. indica* to the second group because it includes *Arum indicum* Lour. sensu Roxb. (1832), but *Arum indicum* Lour. itself appears to be the typical *Alocasia macrorrhiza.* If the second group were separated specifically from *A. macrorrhiza,* then the status of *Arum cordifolium* Bory (1804), *Arum punctatum* Desf. (1829), etc. will have to be investigated as they seem to have a better claim than *Alocasia indica,* if this is typified on ROXBURGH'S description.

1. **Alocasia macrorrhiza** (L.) Sweet in Steudel (1840)56; Schott (1854)409 and (1860)146; Engler (1879) 502; Engler et Krause (1920)84: cf. also Petch (1919), Alston (1931), Merrill (1935) and Furtado (1940).

   A. indica (Lour.) Schott (1854) 410: cf. also Koch (1854), Schott (1860), Engler (1879), Hooker f. (1893), Engler et Krause (1920) and Ridley (1925).

   Arum indicum Lour. (1790)537 and Roxb. (1832)498.

   Arum macrorrhizon L. (1753)965.

   Colocasia indica (Lour.) Kunth, Enumer. III (1841) 39; Hassk. in Hoev. et De Vriese, Tijdsch IX (1842) 160 p.p.; Engler (1879) 494 p.p.; Engler et Krause (1920)69 pro parte typica (ex altera parte= *Colocasia gigantea*).

The binomial *Alocasia macrorrhiza* must be typified on *Arum maximum macrorrhizon zeylanicum* Herm., Parad.

Bat. (1698) 73 t. 73 which represents the large green form common in Malaysia and Ceylon. The type was an edible race cultivated in Ceylon.

A faulty terminology employed by LINNAEUS in describing this species misled some botanists (*e.g.* HOOKER, 1893) to use the binomial to denote a mountainous or semi-tropical species from India whose correct name should be *Alocasia odora* (Roxb.) Koch. The latter has peltate leaves, whereas the leaves of the former are sagittate. In India the real *A. macrorrhiza* goes under the name of *A. indica* (Lour.) Schott, though there are evidences that some species of Xanthosoma are also included under that name.

In Ceylon and Malaya and other tropical countries where *A. odora* does not occur even as an escape and where *A. macrorrhiza* appears to be native, the name *A. macrorrhiza* is usually correctly employed, but almost all its published descriptions and the synonymies reveal the influence of HOOKER f. who was one of the first to use *A. macrorrhiza* as the correct name for *A. odora* (cf. also THWAITES, 1864, and HOOKER f. 1893); but the binomial *A. indica* has been generally used to name the edible species of Xanthosoma long introduced in these parts from America. Some races of the type form of *Alocasia macrorrhiza* furnish a very palatable rhizome, but others are too acrid to be fit for human consumption. I have not been able to detect any external differences in these races.

2. **Alocasia macrorrhiza** var. **variegata** (Schott) Furtado **comb. nov.**

A. indica var. *variegata* (Koch et Bouché) Schott (1860) 145; Engler (1879) 502; Engler et Krause (1920) 88.

A. macrorrhiza var. *brisbanensis* Bailey, Queensl. Flora V (1902) 1697. **Syn. nov.**

A. variegata Koch et Bouché in Index Sem. Hort. Berol., 1851 app. p. 5.

I have not been able to consult the original description of this variety, and so I have followed the interpretation given to it by ENGLER (1879) and ENGLER and KRAUSE (1920) who had access to KOCH'S original description as well as to the living plants, or their progeny, and the type herbarium material studied by KOCH.

It is a smaller form than the type and includes the races described extensively by ROXBURGH (1832) under *Arum indicum* Lour. It is characterised by the presence of transverse brownish or purplish, irregular lines or marks on the petiole. I have seen only two races of this variety; in the one the markings are very conspicuous, and in the other they are faint. The former race appears to be the

typical form of this variety, while the latter is cultivated in Java and Bengal for its edible rhizomes, and also for its marble-sized tubers produced at the end of long root-like structures. ALSTON (1931) records the presence of this variety in Ceylon. Apparently both races furnish edible tubers.

3. **Alocasia macrorrhiza** var. **marmorata** Furtado **var. nov.**

Planta minor quam forma typica. Petiolus viridis maculis albescentibus, irregularibus, paucis variegatus. Foliorum lamina maculis similibus, majoribus conspicuis praedita, interdum per unum latus totum albescens.

This inedible variety is often cultivated in gardens as *Alocasia variegata* or *Alocasia indica* var. *variegata*, a name which, according to the descriptions given by ENGLER (1879) and by ENGLER and KRAUSE (1920), should be applied to the variety having transversely clouded petioles. The petioles in this variety have a few large, creamy spots and the leaf-lamina bears large similar markings; sometimes the entire half is cream.

The type specimen described here was taken from plants grown in the Singapore Botanic Gardens from tubers received from Calcutta Botanic Gardens.

4. **Alocasia macrorrhiza** var. **nigra** Furtado **var. nov.**

A forma typica, cui in aspectu et dimensionibus similis, haec varietas differt petiolis et nervibus primariis in superficie laminae inferiore nigro-purpurascentibus.

This form is large-leaved like the type form but has purple or violet colour in petioles and in the primary nerves in the lower surface of the leaves. In some measure it is easy to confuse this variety with *A. macrorrhiza* var. *rubra*, from which it is easily distinguished by the larger leaves, by the absence of purplish colour in the lower surface of the leaves (excepting nerves), by the upper leaf-surface being dark green (not dark olivaceous green), by the spathes being much longer than the spadices. The young leaves are usually green whereas in the var. *rubra* they are practically purplish in both surfaces.

The plant is quite common in Malaya and often passes as *A. indica* var. *metallica* and *A. indica* var. *violacea*. The stems attain a height of about 6 feet or more, but they are not edible even after a prolonged boiling.

5. **Alocasia macrorrhiza** var. **rubra** (Hassk.) Furtado **comb. nov.**

A. indica var. *metallica* Schott (1860)145 (the trinomial was not published by Schott, though the variety was indicated); Engler (1879)502; Engler et Krause (1920)88.

A. indica var. *rubra* (Hassk.) Engler in Engler et Krause (1920)88.

Colocasia indica var. *rubra* Hassk., Pl. Jav. Rar. (1848)145.

C. odorata var. *rubra* Hassk., Cat. Bogor. II (1844)55.

This very ornamental variety has much smaller leaves and spathes than *A. macrorrhiza* var. *nigra* with which it is often confused. The spathe in var. *rubra* is slightly longer than the spadix, and the purple colour is present in the lower surface of the leaves. Juvenile leaves are nearly purple in both surfaces, but the upper surface becomes dark olivaceous green having a very pleasant polish.

The plant is used medicinally by Javanese who also grow the plant around their houses as a protection against thieves and burglers; for the Javanese believe that this plant has the property of causing a cough in anyone who approaches the plant at night, and coughing would warn the inmates of the houses of the presence of any unwanted guests in the neighbourhood.

8. Varietates Dubiae vel Excludendae

1. *Alocasia indica* var. *diversifolia* Engl. in Engl. et Krause (1920) and its synonym *A. indica* var. *heterophylla* Engl. (1879) are synonyms of *A. Portei* (Shott) Engl. cf. Merrill (1922).

2. *Alocasia indica* var. *violacea* Engl. (Engler et Krause, 1920).

This was based on a specimen cultivated in the Royal Botanic Gardens, Calcutta. Tubers received from these Gardens under the name of *A. violacea* proved to be of a form of *Xanthosoma violaceum*. ENGLER based this variety apparently on sterile material and the description, which is applicable also to *X. violaceum*, is insufficient to determine its exact identity.

3. *Alocasia talihan* Elmer (1938).

The type of this species was cited by MERRILL (1922) under *A. macrorrhiza*. ELMER, finding it to be quite distinct from this species, described it as new, stating at the same time that it might not be an Alocasia at all. Since in the description of the spadix ELMER did not note a sterile appendix which he described in a true Alocasia species, *A. talihan* is, I suspect, a species of Xanthosoma. ELMER recorded that the species was cultivated for its edible tubers.

4. *Colocasia indica* var. *atroviridis* Hassk. (1844).

HASSKARL did not give any description of this variety but referred it to "Ari indici secunda species Rumph. amb. V. p. 308". The Rumphian description is too meagre for its certain identification; but the words "caules subtus fusci

sunt, at talibus lineis seu venis distincti, et maculati" suggest the form described here as *A. macrorrhiza* var. *variegata*.

5. *Colocasia indica* var. *pallida* Hassk. (1844).

HASSKARL referred this variety to "Ari indici tertia species Rumph. amb. V p. 308". It is difficult to identify this variety from the Rumphian description, though "caules albicantes, seu pallide virentes" suggest *Colocasia gigantea*.

6. *Colocasia odorata* var. *viridis* Hassk. (1844).

This was a varietal name proposed for the type form of what HASSKARL called *C. odorata;* but it is difficult to find how he really interpreted this species. *C. odorata* was formerly used indiscriminately to name any large species of Alocasia cultivated in the European hot-houses and the binomial was supposed to be an orthographic variant of *C. odora* Lindl. (1822).

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THE TYPIFICATION OF CALOPHYLLUM CALABA L.

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In the prologue of *Calophyllum Calaba* L., Spec. Pl. ed. i (1753) 514 LINNAEUS gave a number of references which show that the species included at least three elements or syntypes: *(1)* a Ceylon element, *(2)* a Malabar element and *(3)* an American element. The American element was described and figured by PLUMIER under the Caribean name *Calaba* (PLUM., Gen., 39 t. 18), and references to PLUMIER'S plant are found in pre-1753 works of LINNAEUS, namely in Fl. Zeyl. (1747) 90, no. 202, and in ROYEN, Fl. Leyd. Prodr. (1740) 476, both cited in the prologue of *C. Calaba* L. In addition a reference to PLUMIER'S *Calaba* was made by LINNAEUS in his Gen. Pl. ed v (1754) 229 and ed. vi (1764) 266, works having an important bearing on the interpretation of the genera published in LINN., Sp. Pl. ed. i (1753) and ed. ii (1763) (Art. 20). The particulars given in the prologue concerning the habitat of the species includes also the West Indies, for the habitat is stated to be "in Indiis", a phrase frequently employed by LINNAEUS to indicate that a plant occurs in the East as well as in the West Indies.

In view of this inclusion of the American element in the prologue of *C. Calaba* and in view of the facts:—that LINNAEUS adopted the American vernacular name as the scientific epithet of the species; that the treatment given by LINNAEUS in Gen. Pl. eds. v & vi included the American element as a syntype of the genus *Calophyllum;* and that *C. Calaba* was the only species of the genus as published in 1753 to include an American element, it is not surprising that botanists in general should typify *C. Calaba* on the American syntype and make this species as the lectotype of the genus.

I have not been able to consult the treatment given to the different syntypes of the species by WILLDENOW, who in his Spec. Pl. (1800) 1160 suspected the Asiatic elements to be different from the American one, and who is reported to have later published *C. apetalum* Willd. (Mag. Ber. 1811, p. 79) for an Asiatic element of *C. Calaba.* In the absence of the original description of *C. apetalum,* it is impossible to decide which of the Asiatic elements from *C. Calaba* was included in *C. apetalum;* and the subsequent reports are somewhat contradictory. However it is quite certain that A. DE CANDOLLE (Prodr. I, 1824, pp. 562–563) reserved the binomial *C. Calaba* exclusively for the Caribean element, and published *C. spurium* Chois. *ex* DC. to include *C. apetalum* Willd. and at least the Malabar element of *C. Calaba.*

Owing, however, to the contradictory typification of *C. apetalum* and *C. spurium*, some having typified them on the Malabar syntype and others on the Ceylon one, these two binomials have been generally disregarded and later ones are in use, namely, *C. decipiens* Wight (= *C. Wightianum* Wall.) for the Malabar element, and *C. Burmannii* Wight for the Ceylon element.

This exclusion of the Asiatic elements from *C. Calaba* was so generally adopted that, at the Cambridge Botanical Congress (1930), the British Botanists proposed that the genus *Calophyllum* L. (1753) should be typified on *C. Calaba* L. *quoad* the American element. According to a decision of the 1935 Botanical Congress, Amsterdam, this proposal should be followed unless there are grave reasons for adopting another type; and so far no serious reasons have been brought forward for disregarding the type proposed by the British Botanists.

It is true that there have been a few opponents to this general typification of *C. Calaba*. One of the first to select a lectotype of *C. Calaba* from the Asiatic elements was LAMARCK (Encycl. I, 1783, p. 553) who typified *C. Calaba* on the Malabar element quoted as Tsjerou-ponna, RHEEDE, Malab. 4, p. 81, t. 39, in the prologue of the species, interpreting at the same time *C. inophyllum* L. in a wide sense to include not only the Ceylon and the American elements of *C. Calaba*, but also a new one from Madagascar later named as *C. Tacamahaca* Willd. (1811). Had it not been for the fact that the genus *Calophyllum* has to be interpreted on *C. Calaba* L. *quoad* the American element (included also in LINN., Gen. Pl. eds. v & vi) on the recommendations by the 1930–1935 Botanical Congresses, a very strong case could have been made in favour of this Lamarckian typification of the species; for RHEEDE'S plate of Tsjerou-ponna is quoted directly in the prologue of *C. Calaba* as well as in two out of the three additional references given in the prologue, while there is an indirect reference to this plate also in the third citation.

To my knowledge TRIMEN (Journ. Linn. Soc., Lond., XXIV, 1887, p. 143) was the first to assert that the Ceylon element alone should be considered in typifying *C. Calaba*. TRIMEN was then working on HERMANN'S herbarium in the British Museum, London, and had typified, correctly as *C. Burmannii* Wight, HERMANN'S specimen cited by LINNAEUS under *C. Calaba;* but, apparently not realising that other elements were also included in the prologue of *C. Calaba*, TRIMEN remarked as follows:—

"The name *C. Calaba* has been generally abandoned for this Eastern species to which it originally belongs, in consequence of JACQUIN having figured in 1763 (Hist. Select. Stirp. Amer. t. 165)

as LINNAEUS'S species the Martinique plant, to which PLUMIER first gave the generic name *Calaba*, taken from the Caribbee name. LINNAEUS (Sp. Plant. ed. ii, p. 732) accepted JACQUIN'S determination, and hence makes his own species to include both the E. and W.— Indian plants. The name should not be maintained for either."

This view of TRIMEN ignores the Malabar and the American elements from the prologue of *C. Calaba* L. (1753) and therefore cannot be accepted. Yet RENDLE and FAWCETT (Fl. Jamaica V, 1926, p. 200) supported TRIMEN'S views by creating the name *C. Jacquinii* for the American element of *C. Calaba* and by remarking as follows:—

"*C. Calaba* L. Sp. Pl. 514 (1753) is founded on a Ceylon plant (Fl. Zeyl. no. 202) named later *C. Burmannii* Wight (Ill. i, 128, 1838) a different species from the West Indian plant described by JACQUIN under the same name. In Sp. Pl. ed. ii, 732, LINNAEUS added the reference to JACQUIN."

The logical development to these erroneous assumptions of TRIMEN and of RENDLE and FAWCETT concerning the syntypes of *C. Calaba* L. (1753) culminated when ALSTON in his Suppl. to TRIMEN, Fl. Ceyl. (1931, p. 22) adopted *C. Calaba* L. as the correct name for the Ceylon plant with *C. Burmannii* Wight as its synonym. In this treatment of the Ceylon plant, ALSTON has been followed by VAN OOTSTROOM (Blumea, Suppl. I, 1937, p. 196), and by ABEYESANDERE and ROSAYRO (Descript. Check-List Ceyl. 1939, p. 34), despite the fact that this treatment, based as it is on erroneous assumptions, renders it impossible to typify *Calophyllum* L. (1753–1754) on the American element as recommended by the 1930 and the 1935 Botanical Congresses.

In view of the foregoing considerations I submit that *C. Calaba* L. should be accepted as the correct name for the American element named as *C. Jacquinii* by RENDLE and FAWCETT, and its use for any of the Asiatic elements should be rejected as illegal. The nomenclatural treatment proposed here is also in accordance with the procedure which, in my opinion, should be followed in order to secure stabilisation in the nomenclature of plants (FURTADO in Gard. Bull. Straits Settl. IX, 1937, pp. 244–249 and 296–299). Under more recent interpretations of the rule of *nomina ambigua* (Art. 62) it would be possible to demand the rejection of the binomial *C. Calaba* L. as an impriorable name on the grounds that its use in different senses has become a source of confusion; but such a demand has been argued by me to be contrary to the very fundamentals of the Nomenclatural Rules (FURTADO in Gard. Bull. Straits Settl. XI, 1939, pp. 7 and 28).

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   Vol. 3 nos. 1–12, August 1923—March 1925

   Vol. 4 nos. 1–12, June 1926—January 1929.

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